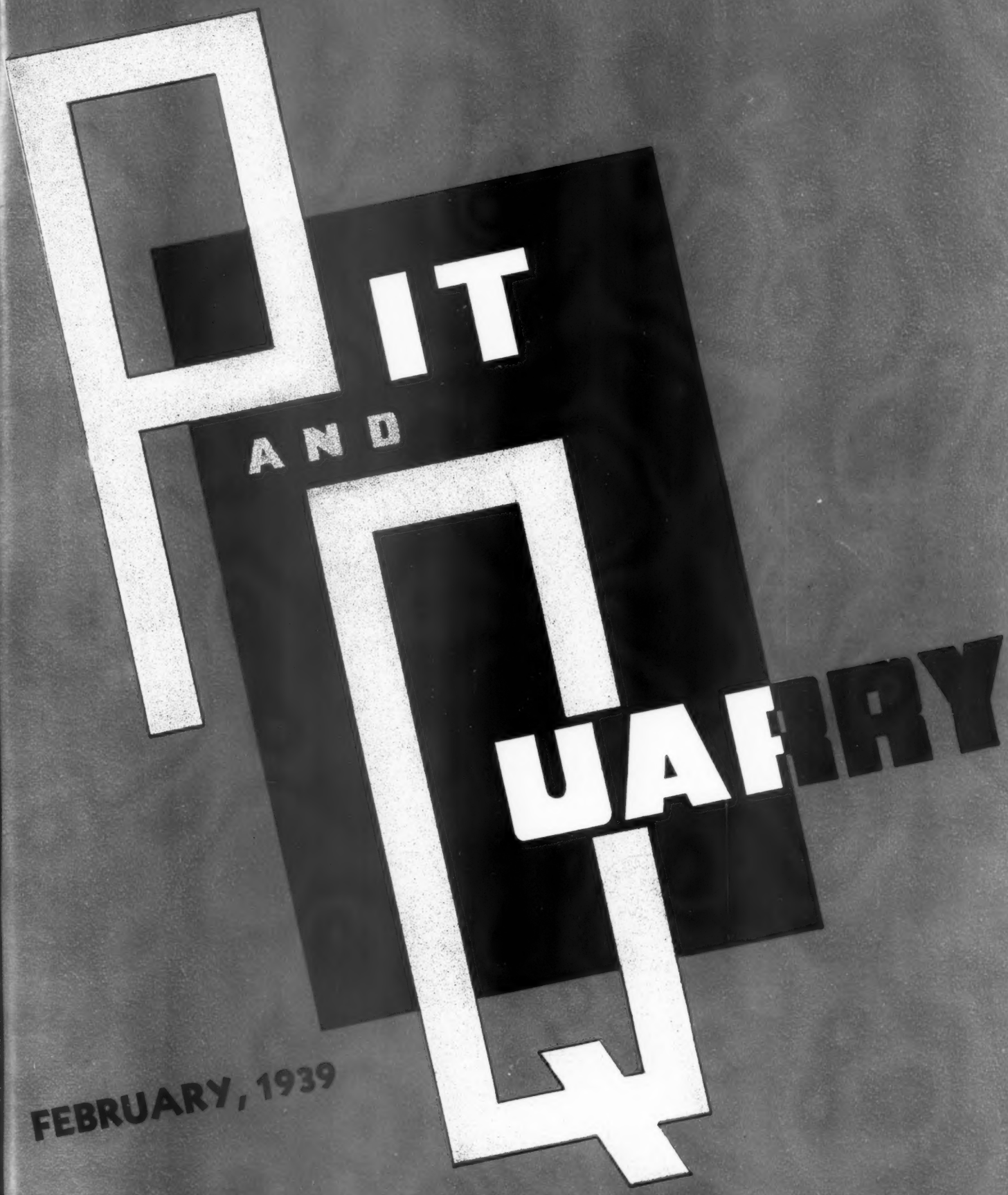
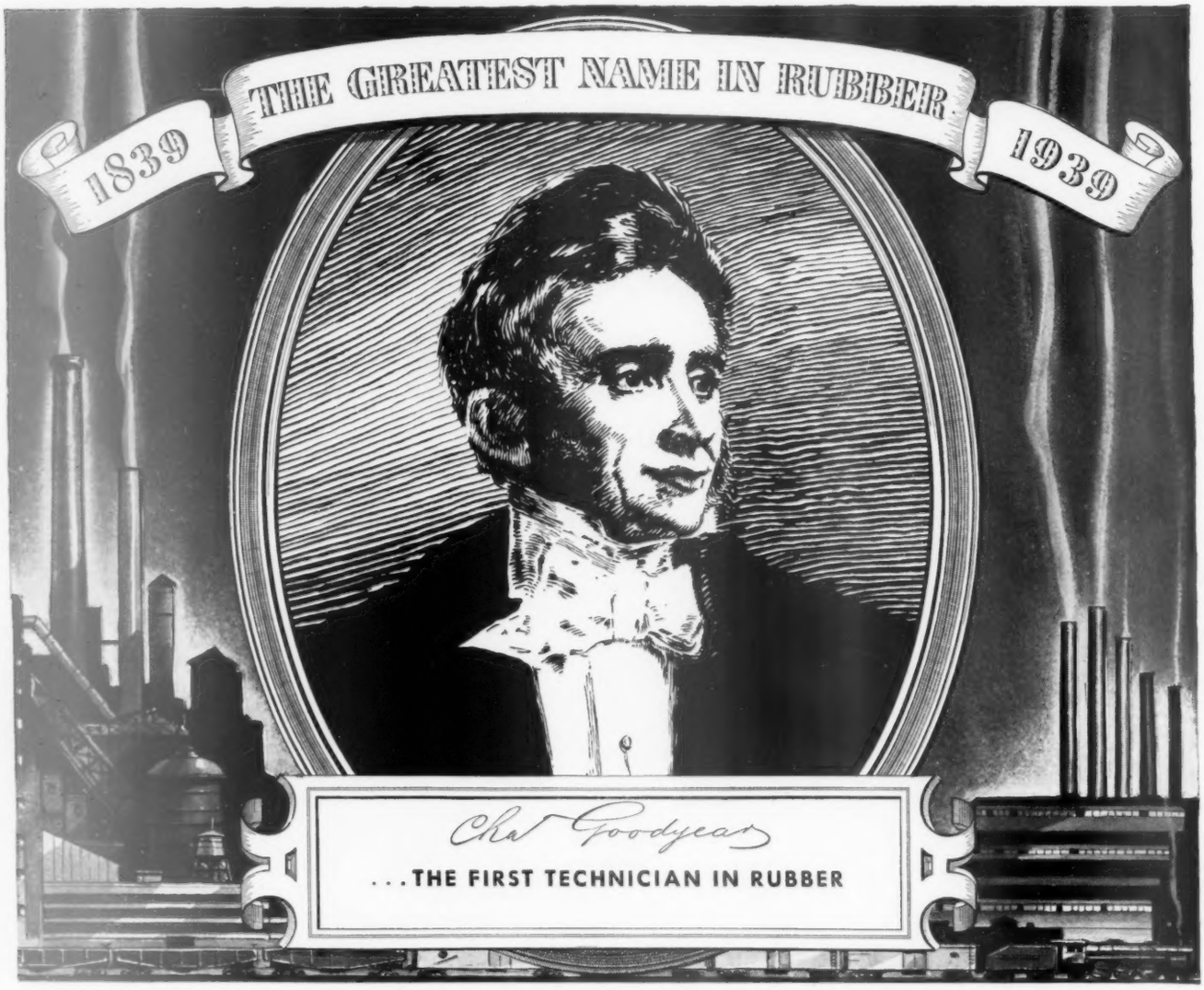


FEBRUARY, 1939

CONVENTION ISSUE

National Sand & Gravel Association
National Ready Mixed Concrete Assn.



"Notwithstanding all the difficulties he encountered, he went on. If there was reproach, he bore it. If poverty, he suffered under it. But he went on, and people then saw, when his invention was completed, that what they had been treating with ridicule, was sublime; that what they had made the subject of reproach, was the exercise of great inventive genius; that what they had laughed at, the perseverance of a man of talent with great perceptive faculties, with indomitable perseverance and intellect, had brought out as much to their astonishment, as if another sun had risen in the hemisphere above...

"I believe that the man who sits at this table, Charles Goodyear, is to go down to posterity in the history of the arts in this country, in that great class of inventors, at the head of which stands Robert Fulton ... in which class stand the names of Whitney, and of Morris, and in which class will stand 'non post longo intervallo' the humble name of Charles Goodyear."

From the address of DANIEL WEBSTER *before the U. S. Circuit Court, District of New Jersey, in 1852.*

HE DISCOVERED *the process of vulcanization that gave us rubber as we know it today.*

He was first to conceive rubber's wide application in meeting industry's many problems.

He built the first practical rubber belting and demonstrated its efficiency over other kinds.

He fashioned from rubber the first successful hose for handling air, steam, oil, acids and other solvents.

He shaped the first enduring rubber molded goods; contrived from rubber the first dependable packing for steam engines.

In all he either manufactured, patented or envisioned more than one thousand different applications of rubber before his death 79 years ago.

His name was Charles Goodyear. He was the first technician in rubber.

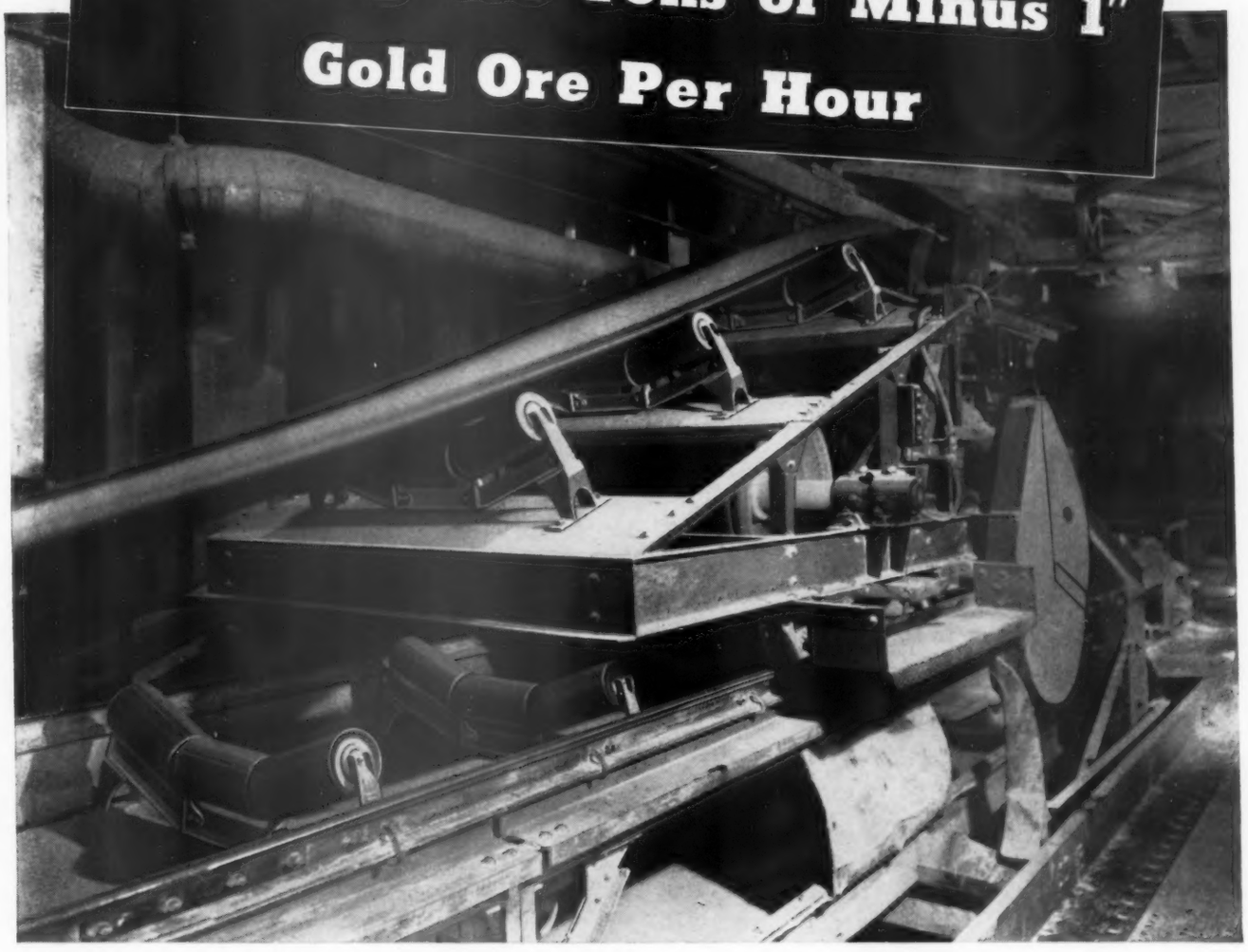
◆ ◆ ◆

● This year marks the One Hundredth Anniversary of Charles Goodyear's discovery of vulcanization. In recognition not alone of his great contribution to the world but also of the self-sacrifice, the faith and courage of the man, this tribute is published by an enterprise founded long after his death — a business that, inspired by his example, seeks by serviceability to deserve his name. Dedicated to that service today is the G.T.M.—Goodyear Technical Man—who in countless new industries of which Charles Goodyear never dreamed carries on his work of multiplying rubber's usefulness through specialized application to industrial needs.

THE GOODYEAR TIRE & RUBBER COMPANY
AKRON, OHIO

JUN 30 1939

Handling 400 Tons of Minus 1" Gold Ore Per Hour



Working 16 Hours Per Day Since Feb. 1931

● This 30" wide anti-friction belt conveyor has been handling minus 1" gold ore for the last 8 years, at the rate of about 6000 tons a day—half of this volume being a circulating load. The tripper is of all-steel construction, completely automatic, electrically controlled.

We welcome the opportunity to serve you whenever you have need for conveying or power transmitting machinery, and shall be pleased to have one of our engineers help you select the right equipment for your individual requirements. Address the nearest office.

LINK-BELT COMPANY

Chicago, Philadelphia, Indianapolis, Atlanta, San Francisco, Toronto, or any of our other offices located in principal cities. 7630

1939
NEW YORK WORLD'S FAIR EXHIBITOR METALS BLDG.

LINK-BELT CONVEYORS of all types . . .

Feeders . . . Vibrating Screens . . . Skip Hoists . . . Bucket Carriers . . . Portable Loaders . . . Speed Reducers . . . Variable Speed Transmissions . . . Silverstreak Silent Chain Drives . . . Silverlink Roller Chain Drives . . . Chain Drives of all types—Malleable Iron, Promal or Steel . . . Elevator Buckets . . . Pillow Blocks . . . Take-ups . . . Gears . . . Sprockets . . . Pulleys . . . Couplings . . . etc.

PIT AND QUARRY, February, 1939. Vol. 31, No. 8. Published monthly by the Complete Service Publishing Company, 538 South Clark Street, Chicago, Ill. Subscription price $1 for 1 year in the U. S. and possessions, Canada, Central and South America; elsewhere $1 additional for each year. Single copies 20 cents. Entered as second-class matter February 28, 1932, at the Post Office at Chicago, Ill., under the act of March 3, 1897.

HUG

offers the

one SURE WAY

to

reduce your Hauling Costs

to a **MINIMUM**

ONLY Hug can give you the benefit of 18 years of heavy hauling engineering based on actual "Built to Meet a Condition" experience.

Hug trucks built on this SURE WAY basis have proven out every time under the most gruelling conditions, not for a year or two, but after 8, 10 and 12 years of continuous operation are still reducing owners' hauling costs. This proven leadership and proven Hug performance eliminates all guess work from your transportation problems.

Hug quarry trucks will meet every demand of modern quarry equipment, cut your hauling costs to a minimum and increase your profits!

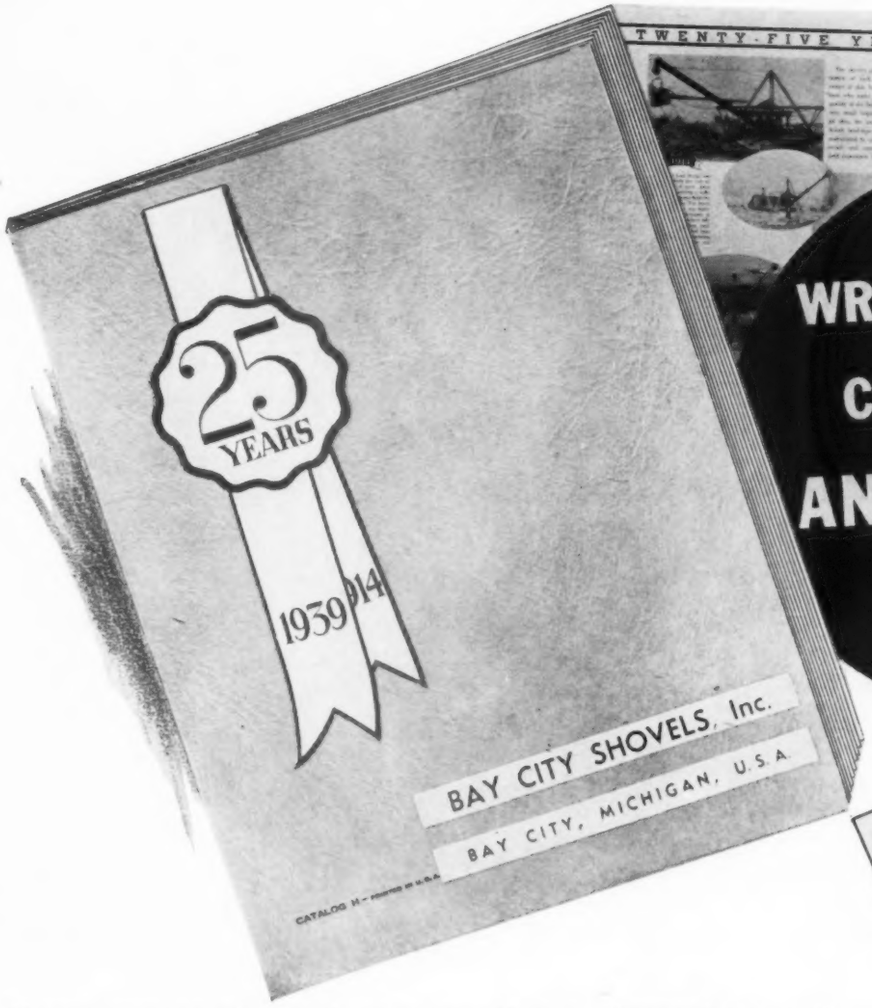
Hug quarry models are available in Diesel or gas engine power and with a wide variation of heavy duty quarry body types. End dump..side dump, or down folding tail gate models ranging from 4 to 25 yard capacities.

Write today and let Hug's engineers discuss your transportation problems with you.

THE HUG COMPANY

601 Cypress St. Highland, Illinois

BUILT TO MEET A CONDITION



WRITE FOR YOUR COPY OF THIS ANNIVERSARY CATALOG

If you own or plan to buy excavating equipment you will want a copy of this attractive, useful 25th Anniversary Catalog. In addition to reviewing the history and progress of Bay City Shovels, it contains a picture story of precision workmanship . . . takes you behind the scenes in our modern, busy plant. Also included are job pictures and condensed specifications on all models ranging from 3/8 to 1 1/4 yard capacities.

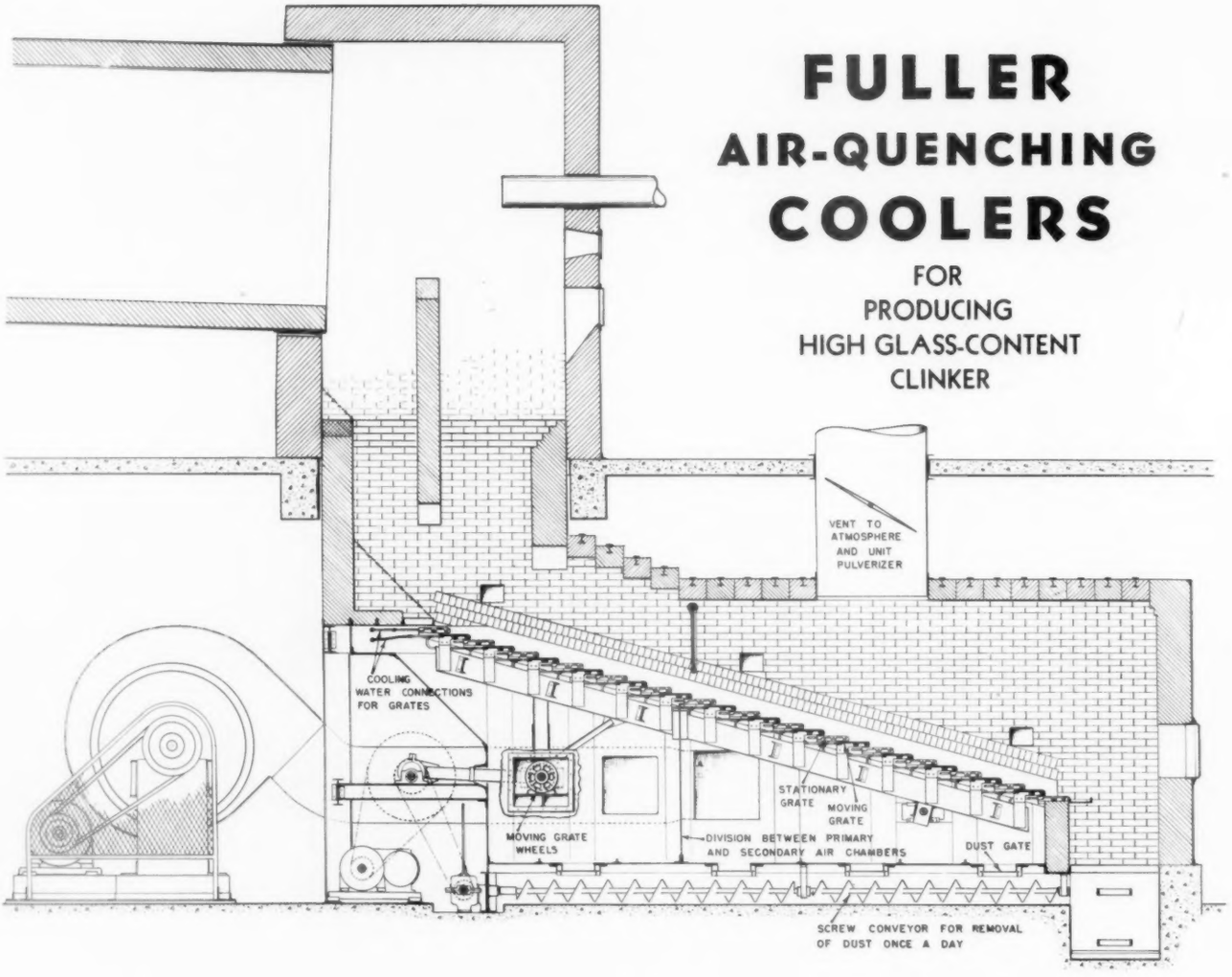
Let this catalog be your introduction to these fast, powerful, economical, easy-to-operate machines—write for your copy of catalog H-3.

BAY CITY SHOVELS, INC.
BAY CITY, MICHIGAN
Export Office: H. M. Hein (OPARO), 330 W. 42nd Street, New York, N. Y.

BAY CITY SHOVELS

FULLER
AIR-QUENCHING
COOLERS

FOR
PRODUCING
HIGH GLASS-CONTENT
CLINKER


VENT TO ATMOSPHERE AND UNIT PULVERIZER
COOLING WATER CONNECTIONS FOR GRATES
STATIONARY GRATE
MOVING GRATE
MOVING GRATE WHEELS
DIVISION BETWEEN PRIMARY AND SECONDARY AIR CHAMBERS
DUST GATE
SCREW CONVEYOR FOR REMOVAL OF DUST ONCE A DAY

FEATURES OF
FULLER AIR-QUENCHING COOLER

Abrupt chilling for production of clinker of high glass content

Mechanically simple; requires comparatively little maintenance

Clinker forms as a substantially flat inclined bed, moved at a uniform rate from chute to discharge end

Grates are water cooled; fixed grates alternate with moving grates

High and uniform combustion air temperatures

Operation under direct observation at all times

Air chamber may be entered a few minutes after clinker is by-passed or stopped

Drive mechanism simple; outside of cooler

Low power requirements

WRITE FOR BULLETIN CO-1
FOR DESCRIPTIVE DETAILS.

THE drawing above illustrates one of the three Fuller Air-Quenching Clinker Coolers to be installed by one of the large cement companies. This installation is of the combined recuperator and final cooler type, with divided chamber. Each of these coolers is to have a capacity of 1000 barrels a day; clinker delivered to the primary or recuperator section at approximately 2500 Deg. F., to be reduced in the final cooling section to approximately 200 Deg. F. In this installation the recuperator section will supply secondary combustion air to the kiln; the air from the final cooling section to be vented to atmosphere and to the unit pulverizer firing the kiln.

Fuller Coolers are built in various types. Some already installed are of the two-stage type, i.e., the recuperator section and final cooling section are separate and distinct units, each independently controlled. They are also built to serve as a final cooler to recuperators already installed or as a recuperator only.

Fuller Coolers are designed with the distinct purpose of securing the maximum efficiency in air quenching to produce clinker of high glass content, efficient heat recuperation, and to discharge clinker at the final temperature desired for grinding.

FULLER COMPANY
CATASAUQUA, PENNSYLVANIA

Chicago: 1118 Marquette Bldg.
San Francisco: 320-321 Chancery Bldg.

CO-1

FULLER-KINYON, FLUXO, AND AIRVEYOR CONVEYING SYSTEMS · · · · ROTARY FEEDERS AND DISCHARGE GATES
ROTARY AIR COMPRESSORS AND VACUUM PUMPS · · · AUTOMATIC BATCH WEIGHERS · · · BIN SIGNALS

Now! THE PLYMOUTH FLEXOMOTIVE

Model KC 45 Ton Diesel-Powered Plymouth Flexomotive

BUILT FOR TOUGH JOBS PROVED ON TOUGH JOBS*

Here's What You Asked For—

First Cost Way below the diesel-electric type.

Efficiency Way above the diesel-electric type. Perfect visibility for SAFETY.

Ruggedness All welded slab frame. Massive construction.

Maintenance Lowest ever recorded.

Flexibility Instant variation of speeds. Up or down. No sliding gears. No jaw clutches.

Background Four thousand hours on the toughest jobs that could be found.

Performance Plymouth 45-ton FLEXOMOTIVE out-pulled, out-performed 65-ton steamer on same job. Get the record.

* One of the Plymouth Flexomotives will go into regular classification yard service in January, where it may be seen in action.

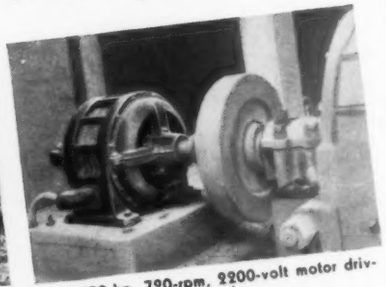
PLYMOUTH LOCOMOTIVE WORKS

Division of THE FATE-ROOT-HEATH CO. Plymouth, Ohio, U. S. A.

100% G-E INSTALLATION
at Longhorn Portland Cement
Continues to Give Low-cost Service

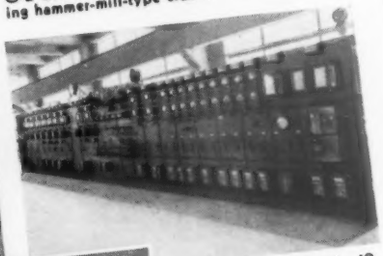
Notes On Trip Through Plant

G-E equipped electric shovel loading Austin chalk into 8-ton cars

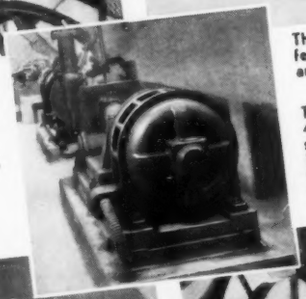


G-E 250-hp, 720-rpm, 2200-volt motor driving hammer-mill-type crusher

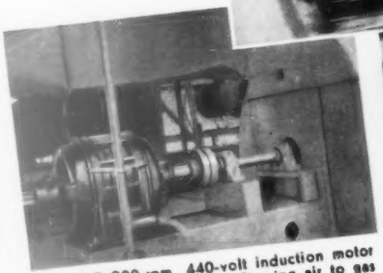
Four compeb mills—40 feet long—driven through one gear reduction by G-E synchronous motors



This G-E switchboard, 49 feet long, meters, distributes, and controls 3000 kva



Two G-E 75-hp, 1200-rpm, 440-volt motors driving slurry pumps. Agitator drive in background driven by G-E 7½-hp, 900-rpm, 440-volt motor



This G-E 900-rpm, 440-volt induction motor drives a 90-inch fan for delivering air to gas burners of kilns

One of two G-E 75-hp, 600/1200-rpm, 230-volt, d-c motors driving kilns

EQUIPMENT INCLUDES MOTORS, DISTRIBUTION TRANSFORMERS, SWITCHGEAR, CABLE, AND CONTROL

NINE years of grueling service have convinced the Longhorn Portland Cement Company that General Electric equipment can "take it." The company is thoroughly satisfied with the performance of the motors, control, switchgear, cable, and distribution transformers installed in its plant near San Antonio, Texas—a 100-per cent G-E installation.

Low Maintenance Costs

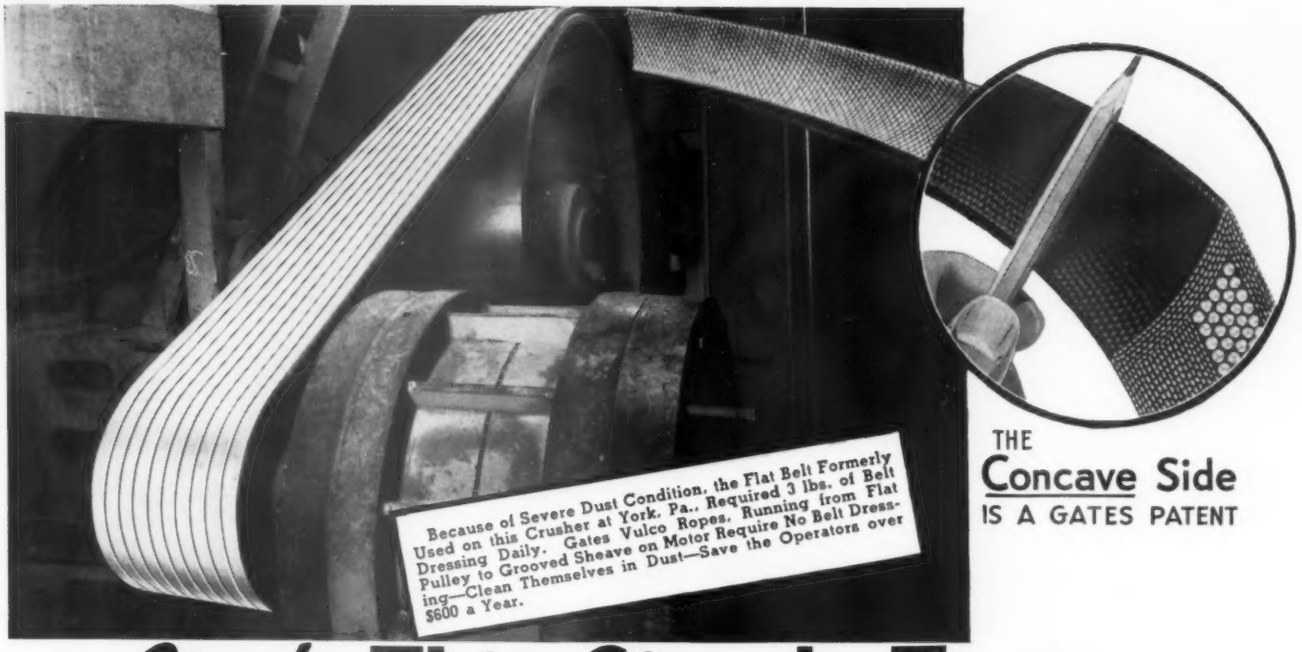
Longhorn quarries Austin chalk, which contains all the elements needed for a high-quality cement. The availability of this excellent raw material and of natural gas for firing the kilns made possible a remarkably simple and compact plant layout. The low maintenance and repair charges on the electric equipment have enabled Longhorn to take full advantage of these favorable conditions.

• • •

If you are considering building a new plant or installing new equipment in your present one, call in the nearest G-E representative. He will be glad to help you co-ordinate your electric power installation. General Electric, Schenectady, N. Y.

GENERAL ELECTRIC

011-408


Because of Severe Dust Condition, the Flat Belt Formerly Used on this Crusher at York, Pa., Required 3 lbs. of Belt Dressing Daily. Gates Vulco Ropes, Running from Flat Pulley to Grooved Sheave on Motor Require No Belt Dressing—Clean Themselves in Dust—Save the Operators over $600 a Year.

THE **Concave** Side
IS A GATES PATENT

Make This Simple Test and *Cut* YOUR transmission Costs!

PICK up *any* V-belt having the ordinary straight side and *bend* the belt. Three things will happen, right before your eyes.

(1) The top of the belt is under tension and grows *narrower.* (2) The bottom is under compression and becomes *wider.* (3) The sides of the belt *bulge out.* (Figure 1, at left.)

This bulging of the straight sided V-belt in its sheave-groove costs you money in *two* ways—(1) The bulge causes uneven sidewall wear—*shorter life!* (2) The bulging side cannot evenly grip the sheavewall—a *loss in transmission* efficiency!

In figure 2, you see how the precisely engineered *concave* side of the Gates Vulco Rope exactly corrects this bulging. Two distinct *savings* result. (1) The Gates Vulco Rope wears evenly—*longer life!* (2) The entire side-wall grips the pulley—carries heavier loads without slippage: saves the belts and also saves your *power!*

The Gates Vulco Rope is the *only* V-belt built with the patented concave side.

THE GATES RUBBER COMPANY

Engineering Offices and Stocks in All Large Industrial Centers

GATES VULCO ROPE DRIVES

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DENVER, COLO., 999 South Broadway DALLAS, TEX., 2213 Griffin Street PORTLAND, ORE., 1231 N. W. Hoyt St. SAN FRANCISCO, CAL., 2700 16th St.

DEPENDABLE

THIS ALUMINUM FOIL SHIELDED SHUNT comprises an outer layer of thin aluminum and an inner layer of highly efficient insulating material. It holds the leg wires tightly together for their entire bared length, thus forming a complete short circuit. The insulating layer protects the short-circuited ends from outside currents. To remove the shield, simply pull the leg wires apart.

DU PONT
ELECTRIC BLASTING CAP
WITH
ALUMINUM FOIL SHIELDED SHUNT
FIGURE 8 FOLD AND BANDED

THIS PAPER BAND holds the cap wires in an easy-to-handle figure 8 fold. No tangling, snarling or kinking. When the band is torn, the natural resilience of the wires makes it easy to straighten them out in the desired manner.

DON'T RUN THE RISK OF PREMATURES. REMEMBER—THE

DUPONT
REG. U. S. PAT. OFF.

EXPLOSIVES *and*

DETONATORS

Another improvement in Du Pont Electric Blasting Caps

New Aluminum Foil

SHIELDED SHUNT

Gives double protection

DU PONT now offers *double protection* against stray currents on all electric firing devices—electric blasting caps, delays, delay igniters, squibs and delay squibs.

The new Aluminum Foil Shielded Shunt affords a short circuit of the leg wires and also shields the short-circuited leg wires from contact with possible stray currents.

Electrical tests have proved that this Aluminum Foil Shielded Shunt gives greater protection to the blaster than any short circuit heretofore offered to the user.

The Aluminum Foil Shielded Shunt can also be used with far less delay—no lost time in untwisting or straightening of leg wires before connecting up.

* * *

The new Aluminum Foil Shielded Shunt is "standard equipment" on all Du Pont electric firing devices for underground use. You may also have it at no extra cost on electric detonators for use above ground by specifying Aluminum Foil Shielded Shunt.

E. I. DU PONT DE NEMOURS & CO., INC.

Explosives Department **Wilmington, Delaware**

MOST DEPENDABLE DETONATOR IS THE SAFEST DETONATOR

BLASTING ACCESSORIES

This Precision in Wire Rope costs no more

You manufacturers and users of fine equipment, with which Wire Rope plays an important part, are largely responsible for this innovation in Wire Rope manufacture.

Your demands for greater precision—more uniformity and a nearer approach to perfection has resulted in Gilmore Precisionbilt Ropes. It has brought together Engineering, Mechanical and Metallurgical science—to produce precision fabricating machines that have been proclaimed an outstanding achievement.

No longer, so far as this plant is concerned, is there any guess work in Wire Rope—but precision to a tolerance of 1/1000 of an inch—a uniformity beyond anything heretofore contemplated—a rope with STAMINA and longer life. A rope that can "take it."

Will you verify this to your own satisfaction by installing a Gilmore Precisionbilt rope on your toughest job.

J&L STEEL

Other J & L Steel Products:

Standard Pipe in seamless and welded — Seamless Steel Boiler Tubes — Hot Rolled Shapes — Abrasive Resisting Plates — Bar mill products including Bars for Concrete Reinforcement — Bar size shapes — Track Spikes — Wire Nails and Spikes—Galvanized Sheet Steel Roofing and Siding — Woven Wire Fencing — Barbed Wire — Soft Annealed Wire.

GILMORE WIRE ROPE DIVISION
MUNCY · PENNSYLVANIA

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PITTSBURGH · PENNSYLVANIA

Lighter Weight for Easier Handling

Light, flexible and remarkably strong—the new Primacord-Bickford Detonating Fuse is easy to handle and hook up. It saves time on every job without sacrifice of safety, dependability and effectiveness. There's a saving on transportation charges, too, since the gross shipping weight of 1000 feet of plain Primacord on its wooden spool is only 20 pounds—500 feet only 11 pounds.

The Primacord Booklet gives you complete information on this new detonating fuse and its profitable use. Send for free copy today.

THE ENSIGN-BICKFORD CO., SIMSBURY, CONN., U. S. A.
Makers of Cordeau-Bickford Detonating Fuse—and Safety Fuse Since 1836

PRIMACORD-BICKFORD *Detonating Fuse*

PB5

Check these IMPORTANT ECONOMICAL FEATURES

Added Resistance to

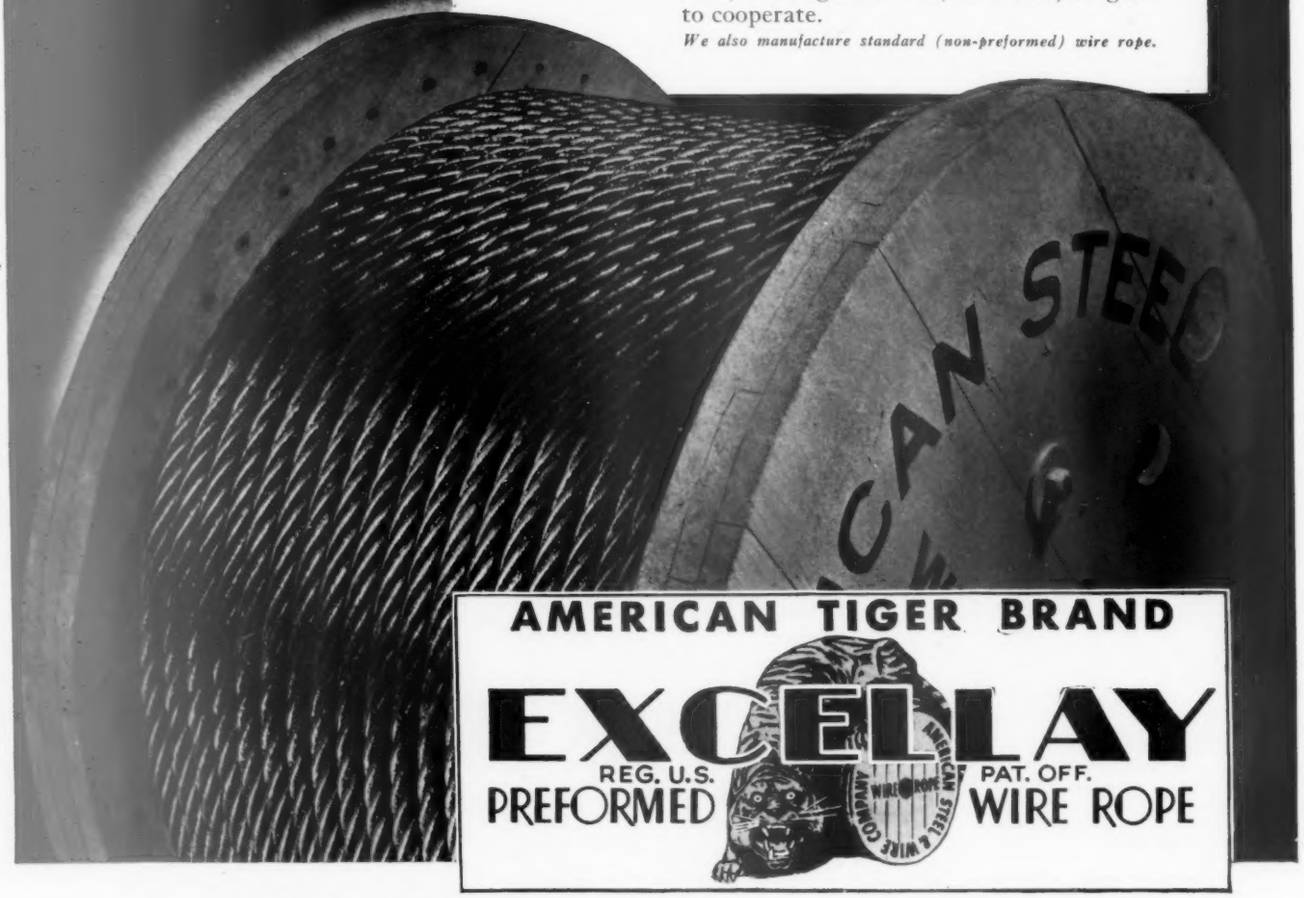
- √ FATIGUE
- √ BENDING STRESSES
- √ KINKS
- √ ROTATION ON SHEAVES

. . . plus

- √ EASE AND SAFETY IN HANDLING
- √ BETTER SPOOLING ON THE DRUM

To the user of wire rope every one of these features means a saving of money. And in EXCELLAY Preformed wire rope you get them all! Think what *that* means in terms of economy. So why not get greater value for your money by specifying EXCELLAY Preformed when ordering wire rope. And if you need technical assistance with any of your problems, our engineers will, of course, be glad to cooperate.

We also manufacture standard (non-preformed) wire rope.



AMERICAN TIGER BRAND

EXCELLAY

REG. U.S. PAT. OFF.

PREFORMED WIRE ROPE

AMERICAN STEEL & WIRE COMPANY

Cleveland, Chicago and New York

COLUMBIA STEEL COMPANY

San Francisco

United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

Tool changes are *Easy* . . . with

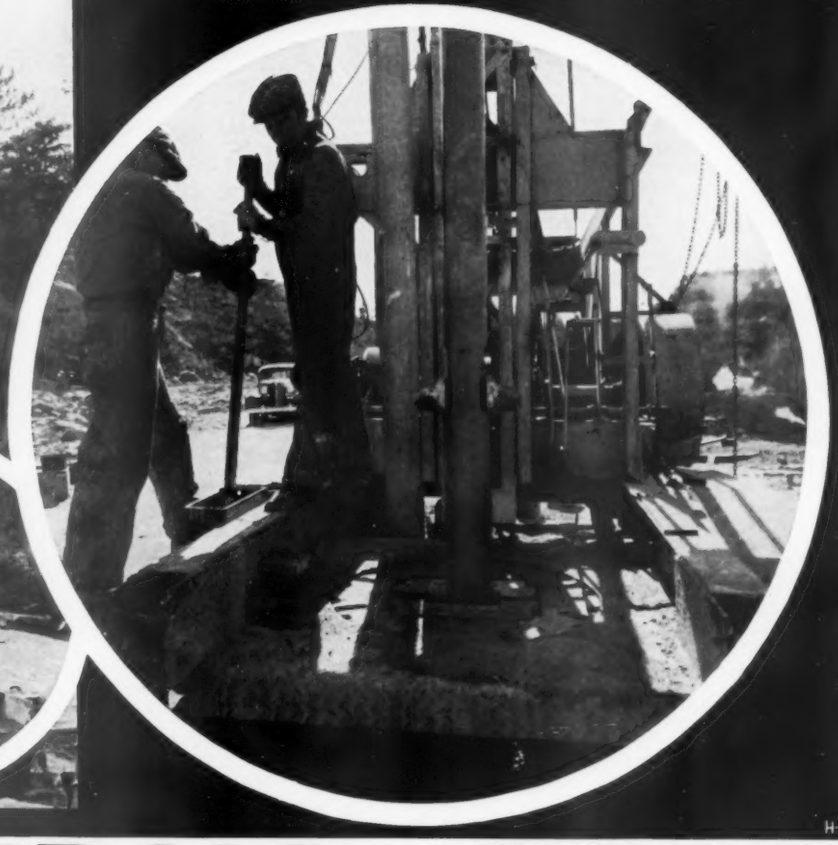
BUCYRUS ARMSTRONG

BLAST HOLE DRILLS

FREQUENT setups and tool changes take a considerable portion of the blast hole driller's time. But with the new mechanical tool wrenches, now available on all Bucyrus-Armstrong blast hole drills, tool changes are made quickly, easily . . . and safely. By eliminating platform obstruction and the handling of heavy tools, the possibility of operator accidents is greatly reduced and the accurate setting of tool joints assured. Save money by changing costly preparation time into productive drilling time.

There are other modern, outstanding refinements on Bucyrus-Armstrong drills — the 27-T, 29-T, and 42-T — that will help you lower your blast hole preparation costs from 30 to 50 per cent. Leading open pit mine and quarry operators, everywhere, find that Bucyrus-Armstrong blast hole drills are the modern answer to the need for lower drilling costs.

Write TODAY *for complete information about the Bucyrus-Armstrong line of cost cutting blast hole drills.*



H-9

BUCYRUS - ERIE

SOUTH MILWAUKEE, WISCONSIN, U. S. A.

BE AMONG THE FIRST TO ACQUIRE THIS NEW MAILING LIST

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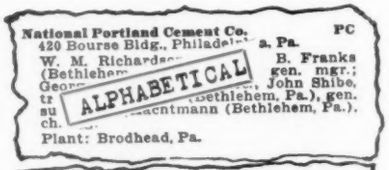
. . . . *Alphabetical*, by Company Names →



. . . . *Geographical*, by Plant Location →

Hundreds of New Names . . . Others Checked and Revised

The 1939 Directory section of Pit and Quarry HANDBOOK is the most complete ever published. It is up to the minute—as modern as skill and money can make it. It's checked and double checked. Ready about Feb. 15th.

It gives you the names of the companies, their officers, the number and locations of plants, their capacities and equipment, and the names of the men who buy.

The technical section gives the latest production methods and practices. And there are consolidated catalogs of equipment.

The new and 32nd edition will be of greatest benefit to those who order promptly and receive their copy immediately. Use coupon below. Select either the complete Handbook and Directory, or the convenient Directory alone in smaller, flexible binding, more convenient for salesmen. The price is the same in either case.

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Pit and Quarry, Date.....

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Please send.....copies of the 1939 HANDBOOK ($10.00 per copy) ☐ Check enclosed.....

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Name ..... Title.....

Company .....

Town ..... State .....

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MOVE ROCK AT LOW COST

Move rock with Koehring equipment for low cost operation. Rock digging requires rugged equipment, as well as high speed, to maintain a maximum profit schedule. Many leading contractors now accept Koehring Shovels and Dumptors as dependable profit insurance in the toughest of rock digging and hauling. Dig it and haul it with Koehring.

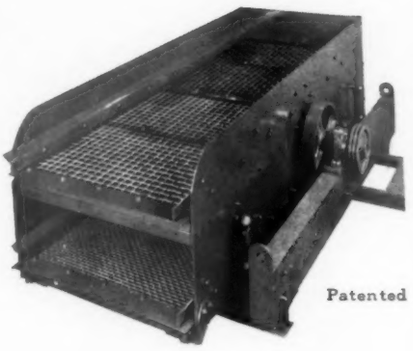
KOEHRING COMPANY

CONSTRUCTION EQUIPMENT • MILWAUKEE, WISCONSIN

EVERYTHING UNDER CONTROL FOR 1939!

All indications point to a very active year for the aggregate producers. Let **SECO Vibrating Screens,** with their Controlled Circular Motion make it your most profitable year. This patented method of control results in:—

—Longer Bearing Life
—Highest Screening Efficiency
—Lowest Upkeep Cost
—Positive Uniform Vibration
—No Rocking or Bobbing of Screen
—No Vibration in Supporting Structure



Patented

In Fact:—
"Everything Is Under Control"

Users throughout the country testify to the merits of this Modern, Advanced Design Screen.

SECO
VIBRATING SCREENS

Send for our 1939 Catalogue

SCREEN EQUIPMENT COMPANY

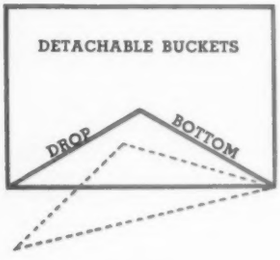
9 LAFAYETTE AVE. BUFFALO, N. Y.

DEMPSTER DUMPSTER

PRECISION CONTROLLED DUMPING

LOADING—at shovel level

No Overhang
No Sidesway
No Counterweight



DUMPING—one man control

SUPERIOR BUCKET DESIGN . . . easier operating control . . . sturdier construction . . . and drop bottom, are exclusive features and advantages that put the DEMPSTER-DUMPSTER "out in front" as material handling equipment.

The buckets are carried up and on the truck chassis with more than 50% of the load ahead of the rear axle.

WRITE US FOR FACTS

DEMPSTER BROS. INC. KNOXVILLE TENNESSEE

WASHINGTON NEW YORK BOSTON NASHVILLE CHICAGO

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It controls your profits

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CONTROL THE SMOKE!

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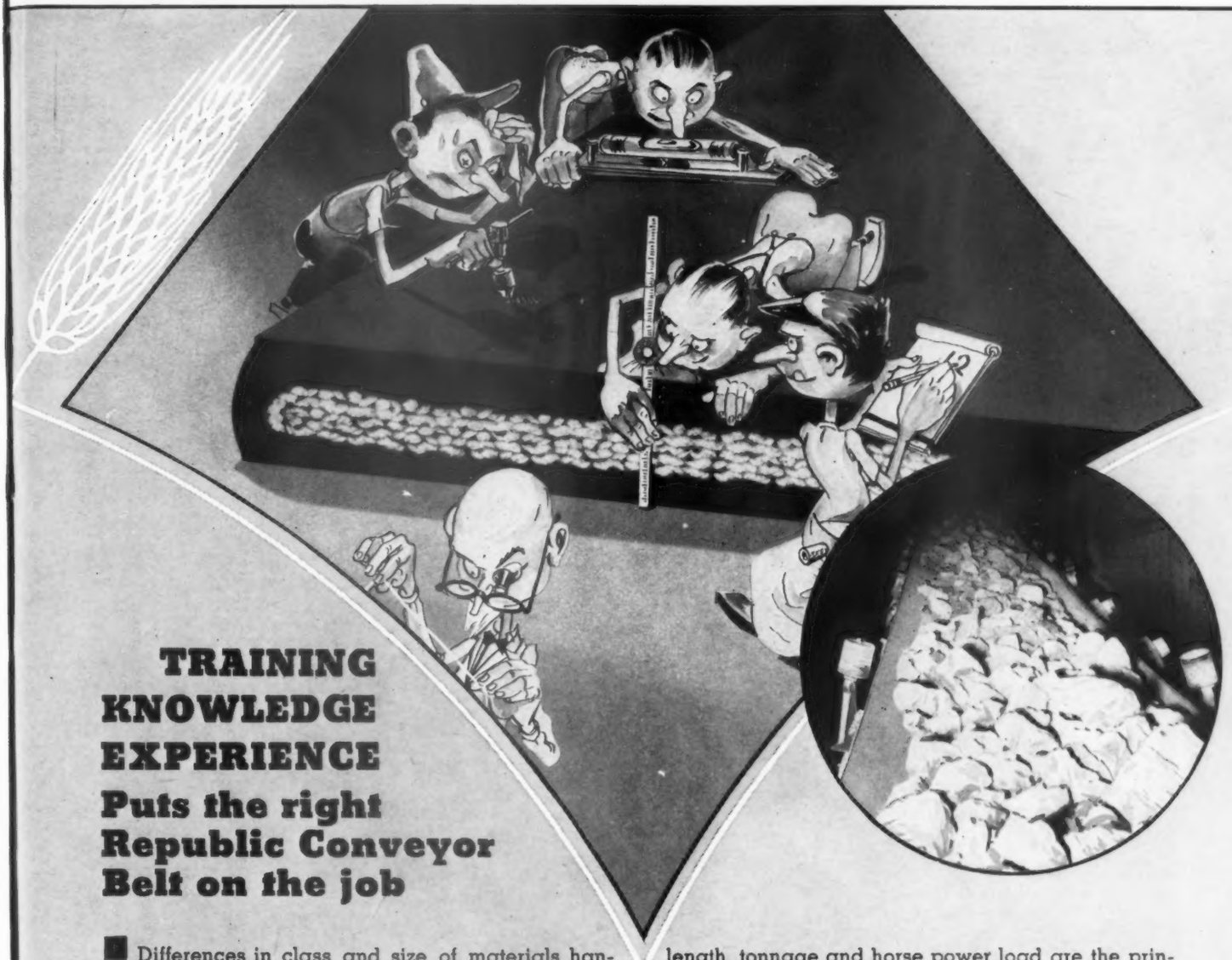

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Vol. 31 February, 1939 No. 8

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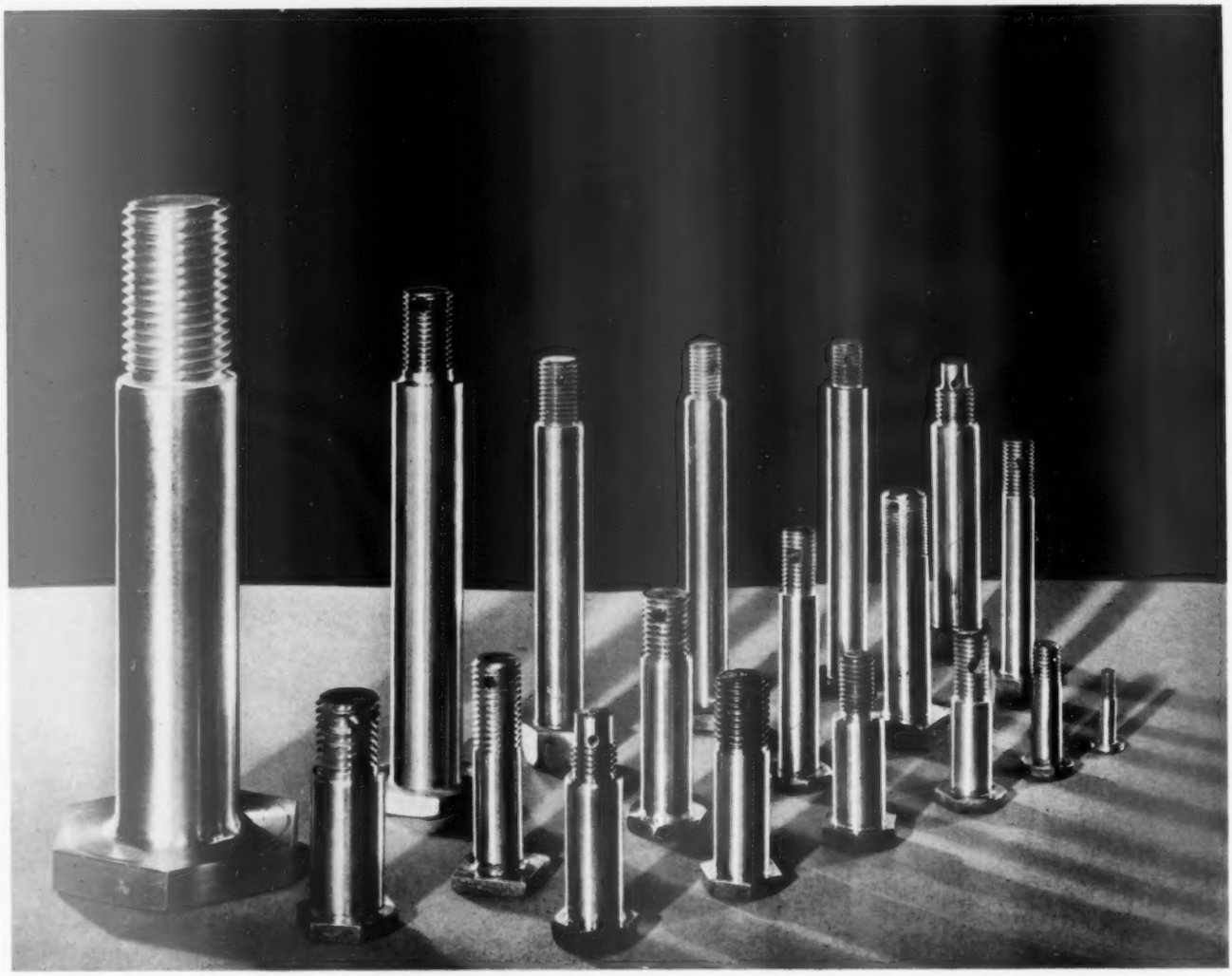

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PIT AND QUARRY

CHICAGO FEBRUARY, 1939

Concrete Men Will Gather in Chicago

NEW METHODS TO BE REVEALED

Subjects of paramount interest and importance by well-known speakers of wide experience and recognition will keep every one continually alert who attends the Concrete Industries Conventions and Exposition, to be held at the Sherman Hotel in Chicago on February 7, 8 and 9.

Of equal importance is the big Exposition to be held in connection with these meetings. Never in the history of concrete men have such revolutionary developments occurred within the space of a year, and the Exposition halls will be filled with displays of many of these new developments. In addition to the meetings of the several groups comprising the Concrete Industries, the Illinois Builders League is holding its annual meeting at the same time and place. This meeting, and the Exposition which is the only construction show east of the Rocky Mountains this year, is expected to draw a good attendance of general contractors who do heavy construction work from all surrounding states.

The high point of the conventions will be the joint session, to be held on Wednesday, February 8, when all groups will meet together. At the morning meeting, various newer types of concrete floor construction will be described. Systems that have won local acceptance in the east, south and middle west will be explained, and their merits exposed to the critcal eye of all. In the afternoon, the program will be devoted to discussions of housing and of the general progress in the concrete industry.

Subjects to be covered in meetings of the American Concrete Contractors Association include a description by a general contractor of his experiences with the "tilt-up" method of building concrete houses; newest developments in mixing and handling concrete; the placing of concrete by the vacuum process; and modern forming methods and the use of form accessories on a wide variety of jobs.

Other subjects to be covered will include opportunities for concrete contractors in cities of medium size; markets for concrete; and how to get business from a building boom.

The program of the National Concrete Masonry Assn. will feature markets in housing, but will also include discussions of merchandising and advertising. Of even greater interest, however, will be the description of tests on concrete masonry units and on walls which have been made during the past year, and which are still in progress. The use of these tests for selling will be explained. Still another important feature will be the description of several new types of products plants that have recently been built.

Highlights of the program of the Cast Stone Institute in convention at the Bismarck Hotel on February 6 and 7 will be a discussion of the theory and practice of reinforcement in cast stone, changes in the building market affecting promotion and sale of cast stone, application of special aggregate facings to cast-in-place concrete, and the use of cast stone facings on standard concrete masonry units.

There will also be many group meetings and Tuesday evening has been chosen as the time when most of these will be held. In addition, there will be a number of round-table gatherings during which individual problems may be presented for discussion.

From all indications, the 1939 gathering of concrete men will be one of the livest gatherings that has occurred and a record-breaking attendance is promised.

Portions of the National Gypsum Co. plant at Niles, O., which were destroyed by fire on December 27, are being rebuilt under the supervision of J. J. Manofsky, plant manager. Production at the Niles operations has been suspended until the work of reconstruction has been completed.

Push Rebuilding of Alsen Cement Plant

NEW STORAGE SILOS COMPLETED

Work of rehabilitating the Lehigh Portland Cement Co. plant at Alsen, N. Y., is proceeding as rapidly as possible, with about 40 men employed on the job.

Twenty new silos, about 75 ft. in height and approximately 30 ft. in diameter have been constructed by the Fairmount Construction Co. of New York, N. Y., and the silos are arranged in four groups of five each.

The workmen are now clearing up the premises and putting a new roof on the old boiler room. Part of the old kiln building has been removed and the roof on the grinding department has been taken off. A switch from the West Shore Railroad tracks to the plant has been installed and the tramway has been surveyed but not constructed as yet.

The offices have been remodeled and an old storehouse was torn down to make room for the new silos.

Weather conditions permitting, work will be continued all winter, as it will be necessary to repair all of the buildings before the new machinery can be installed.

It is said that the work of rehabilitation will probably take most, if not all, of the year.

Trade Unionists Boycott Car of German Cement

A carload of German-made cement was boycotted by the American Federation of Labor building trade unionists in Oakland, Calif., last month. The cement, part of a shipment of 340 tons brought as ballast on the Hamburg-American line boat, City of Oakland, was declared "hot cargo" by the building trades workers after it was offered for sale at $1 a barrel in competition with American-made cement at $2.50 a barrel.

Dawson Predicts Fair 1939 Business Gains

BASES OPINION ON SURVEY

P. G. Dawson, vice-president and treasurer of the Manitowoc Portland Cement Co. predicts a fair increase in general business during 1939. He bases his opinion on the survey completed last month by the company's sales representatives.

"In recent months," Mr. Dawson points out, "the building industry has shown signs of material improvement because of increased building permits and the value of construction contracts awarded. This increase undoubtedly will continue into 1939. If the present feeling of optimism continues, the building industry should have a bright future as there is an abundance of private capital ready to be used in residential construction, commercial buildings, and industrial expansion.

Forecast Increases in First-Quarter Loadings

Forecasts for the first quarter of 1939 by the Regional Shippers' Advisory Boards indicate a total increase in carloadings of 9.9 per cent. for all commodities.

Sand, gravel and crushed-stone shipments are expected to rise 7.5 per cent. over the same period of last year, cement shipments will increase 4.8 per cent. while lime and plaster loadings are expected to be up 10.9 per cent.

Asphalt Conference at Los Angeles, Feb. 27

Twenty years of progress in highway construction, with analysis of present materials, methods and equipment will be the theme of the Twelfth National Asphalt Conference, to be held under the auspices of The Asphalt Institute at the Biltmore Hotel, Los Angeles, Cal., during the week of February 27.

Limestone Products Firm Is Adding Equipment

In order to increase the output of its poultry grits, marketed under the tradename "Kal-Kar," the Pacific Limestone Products Co., Santa Cruz, Cal., is spending $5,000 for new equipment, according to Fred Johnson, president.

House Has Roof, Joists and Walls of Concrete

Evansville's "home of tomorrow," which is attracting nationwide attention, assumed a more finished appearance recently when the concrete slab roof was placed. It was the last operation in the erection of the model concrete dwelling, sponsored by the Concrete Supply Co. of Evansville, Ind.

Although many important details of finishing remain to be completed before the home is ready for occupancy, the concrete-joist floors and concrete-masonry walls of random ashlar design have already been completed, contributing their share of the beauty and durability built into the model home.

Mattison Elected Head of Slag Association

Members of the National Slag Assn. gathered at the Raleigh Hotel, Washington, D. C., for the 21st annual convention.

George A. Mattison, Jr., Woodstock Slag Corp., Birmingham, Ala., was elected president and L. E. McDermut of the Illinois Slag & Ballast Co., Chicago, Ill., was chosen vice-president. H. J. Love, secretary and treasurer, located at the association's offices in the Earle Bldg. at Washington was again named to that office for another year.

U. S. Gypsum Co. Buys Nephi Plaster Plant

The United States Gypsum Co. has purchased the plant and assets of the Nephi Plaster & Mfg. Co., Salt Lake City, Utah.

The Nephi plant, located at Gypsum, Utah, has manufactured gypsum products for a number of years. Sales offices are maintained in Salt Lake City.

Sand-Lime-Brick Assn. Convenes at St. Louis

The Sand-Lime Brick Assn. is holding its 34th annual convention February 6 and 7 at the Statler Hotel in St. Louis, Mo.

According to J. Morley Zander, secretary, the making of larger units than the conventional brick is scheduled to be the important topic for discussion.

Petoskey Taking Bids on Dust Collectors

Bids are being taken by the Petoskey Portland Cement Co., Petoskey, Mich., on dust-collecting equipment to be installed before the plant re-opens for spring operation.

Three concerns are reported to have submitted bids on the job.

The Southeastern Sand & Gravel Co., of Anniston, Ala., has broken ground for construction of plant to manufacture concrete drain and culvert pipe.

New Gypsum Plant to Operate About Mar. 1

RAW MATERIAL BEING STOCKED

The new Savannah, Ga., plant of the National Gypsum Co., now under construction, will be ready to begin production about March 1, according to an announcement by M. H. Baker, president.

A considerable stock of raw gypsum has already been stock-piled at the site of operations, the cargo having been shipped by water from the company's mines in Nova Scotia.

New Plant to Cure with High-Pressure Steam

A new and modern concrete-block plant, utilizing high-pressure steam for the rapid curing of the units, is under erection at Seaford, Del., by the recently-formed Delaware Concrete Products Co.

The plant will have a reported capacity of 15,000 units per 8-hr. day.

A contract to supply $148,000 worth of brown phosphate rock for the fertilizer works at Wilson Dam has been awarded the Hoover & Mason Phosphate Co., Chicago, Ill., by the Tennessee Valley Authority.

Recent Equipment Installations ★ ★ ★

The New York Trap Rock Corp. has placed an order for 18 Easton Phoenix trailers for its various plants; eight Easton Phoenix semi-trailers have been in use at its Haverstraw, N. Y., operations since November 4 of last year. . . . *Considerable new equipment has been installed recently by the J. & K. Stone Co., Fairmont, Ind., including two Allis-Chalmers crushers, a Plato triple-deck vibrating screen and Central Rubber Co. conveyor belting.*

Two 2½-cu.yd. Blaw Knox truck mixers were recently placed in service at the ready-mixed-concrete plant of the Southern Builders' Supply Co., Louisville, Ky. . . . *A Simplicity two-deck vibrating screen was installed in January at the Logansport, Ind., plant of the American Aggregates Corp.* . . . Several new Jaeger truck mixers have been added to the fleet operated at Canton, O., by the United Sand & Gravel Co.

Quaker City conveyor belting has been installed in the new plant of the Lincoln Sand & Gravel Co., Lincoln, Ill. . . . *A new 75-hp. Diesel engine and pump are being fitted to the dredge operated by the Wilkey Gravel Co., Lilbourn, Mo.* . . . A new Winslow truck scale has gone into service at the plant of the Glenn Worrell Gravel Co. near Columbus, Ind.

Silicosis Tops Other Hazards in Wisconsin

REVEAL MANY SERIOUS CASES

Silicosis has been branded the most serious occupational disease in Wisconsin in 1937 as a result of studies which have been completed by the state industrial commission.

In seriousness of its effects, although not in the actual number of cases, silicosis exceeded all other occupational diseases combined among the 753 compensable cases settled by the commission in that year.

Despite the number of serious silicosis cases, Voyta Wrabetz, chairman of the industrial commission, praised Wisconsin industries which "have performed almost a miracle in reducing the amount of silica in the breathing zones of workers to relatively safe concentrations."

"Because many employees have worked 20 or 30 years in massive concentrations of silica dust without slowing down their efficiency," contended Wrabetz, "a greater injustice would be done the worker and industry by firing him in such instances than by leaving him at work."

Promiscuous discharge is discouraged in Wisconsin by requiring that the employer pay for rehabilitating such employes.

Opens New Block Plant in New Jersey Town

The Faber Cement Block Co. began operations about the first of the year at its new plant at Paramus, N. J., near Hackensack. The new plant structure, 58 ft. by 106 ft. in size, houses a Stearns Joltcrete machine which manufactures all the units now being produced.

Old Soapstone-and-Talc Deposit Again Operated

The Walter S. McLean Co. of San Francisco is reported to have reopened its soapstone and talc deposits at Ione, Cal., and is aiming at a production figure of 1,000 tons monthly.

The output is consumed entirely on the Pacific Coast by the automobile-tire and other industries.

Three Universal Plants Win Safety Trophies

Perfect safety records in 1938 were made by the Buffington, Ind., Duluth, Minn., and Waco, Tex., plants of the Universal Atlas Cement Co., according to E. D. Barry, director of industrial relations for the company.

This record qualifies them to receive the Portland Cement Assn. safety trophy which is awarded only to plants operating a complete calendar year without a lost-time accident. The Buffington and Waco plants have now won the trophy two different years; Duluth seven years, and each of the company's six other plants one or more years.

Prof. Scholer to Carry on PCA Research Job

A year's leave of absence starting February 1, 1939 has been granted Prof. C. H. Scholer, head of the department of applied mechanics at Kansas State College, Manhattan, Kan.

Prof. Scholer is taking the leave to do special research for the Portland Cement Assn. on the durability and causes of failure of concrete.

New Machinery at N. Y. Graphite Operations

New machinery is being installed in the Morristown, N. Y., graphite-processing plant of the Long Valley Ore Co. which will increase production 50 per cent., according to William Borrman, president of the company.

The crude ore, a soft, brittle stone, is trucked from the deposit at Pope's Mills to Morristown, where the company maintains a milling-and-concentrating plant on the St. Lawrence River.

The Gypsum, Lime & Alabastine Co., Paris, Ont., Canada, is constructing two lime kilns, track and trestle work, at Beachville, Ont., to cost about $75,000.

Coming Events

February 7-9, 1939, Chicago, Ill. Annual conventions, National Concrete Masonry Assn., American Concrete Contractors' Assn. and Concrete Industries Exposition, Hotel Sherman.

February 23-25, 1939, San Francisco, Cal. Annual convention, American Concrete Pipe Assn.

March 1-3, 1939, New York, N. Y. Annual meeting, American Concrete Institute, Hotel Roosevelt.

March 7-10, 1939, San Francisco, Cal. Annual convention and show, American Road Builders' Assn., Civic Auditorium.

Superior Portland Cement Has Profit

EARNINGS LOWER THAN 1937

The Superior Portland Cement Co. earned net profit for 1938 of $257,661, according to a preliminary report. After payments of $3.30 a share on 75,240 shares of participating class A stock, this is equivalent to more than 9 c. a share on 100,000 shares of class B stock.

In 1937 the company reported a net profit of $428,363, equal after class A dividends to $1.80 a share on class B stocks. As of December 31, 1938, the company's balance sheet showed current assets of $1,644,097, including $469,137 cash, and current liabilities of $309,109. A year before the company showed current assets of $1,566,511, including $540,638 cash, and current liabilities of $248,861.

Illinois Producer to Build $35,000 Plant

The Rock Island Sand & Gravel Co., Rock Island, Ill., has purchased 75 acres of deposits near Milan, Ill., and has started the erection of a modern washing-and-screening plant at a cost of about $35,000, according to H. J. Larkin, secretary of the company.

The new operation is expected to be ready for production by late spring.

New Arkansas Plant to Refine Bauxite Ore

The Porocel Corporation, subsidiary of American Cyanamid & Chemical Corporation, will shortly begin construction of a plant at Little Rock, Ark., to manufacture a product from bauxite ore for use in petroleum refining.

C. M. Shaeffer, vice-president of an affiliate, the Attapulgus Clay Co., will be transferred to Little Rock as vice-president and general manager. The product processed from bauxite ore is used in bleaching by refineries.

Start Production at New Gravel Plant

The new plant of the Grant-Pacific Rock Co. near Lindsay, Cal., is scheduled to start production in February.

According to W. E. Blanton, manager, about $75,000 was invested in the new operation. The old plant at Lemon Cove is to be dismantled after production gets under way at Lindsay.

Fire caused about $2,500 damage at the asphaltic-concrete plant of the Massachusetts Broken Stone Co. near Weston, Mass., recently.

EDITORIAL

The Cult of the Rising Curve

AMONG the ambitions of most of the people with whom life offers us the opportunity of becoming reasonably well acquainted is the desire to acquire an income, to augment that income from time to time, and to advance their standard of living as the years pass. The acquisitive desires and the consumption desires of these people seem to have no end. At any rate the genius of inventors, the acumen of business men, and the skill of professional merchandisers have not yet plumbed the depths of their wants.

Some of these desires are innate, such as the desire for food, clothing and shelter, the liking for physical comfort, the wish to obtain these necessities of life and some of the luxuries it affords with the minimum expenditure of physical and mental energy. Others are acquired, some through a gradual surfeiting of those wants which are most easily satisfied, some through pressure from outside sources, some through the desire to experience satisfactions as yet unknown to them. Thus, a diet of pork and beans expands into one of sirloins and artichokes, a tenement room grows into a house and yard, the newspaper loses ground before the attacks of books and magazines that satisfy deeper intellectual cravings, as the wants that are most easily filled open the way to more cultivated and more elevated tastes. From the outside come the pressure of suggestion offered by new ideas, new discoveries, new inventions, which create and develop new desires and new curiosities, and the spirit of social rivalry which tempts people in one economic stratum to ape the expenditures of those in higher economic strata. As the amount of energy necessary to obtain these satisfactions decreases, the amount of leisure grows, and with it comes a hunger for new experiences, for loafing at fashionable resorts, for playfully dabbling with the primitive occupations of hunting and fishing and work in the open, for establishing additional residences in other states and countries, for indulging in the many other forms of conspicuous waste that provide outlets for excess income.

So the makers of every type of consumer goods adjust their production schedules to take care of this apparently ever-growing demand for more, newer and better commodities. They count not only on the improvement in each person's individual economic situation that we have all come to recognize as the attainment of a natural and laudable ambition, but they confidently expect that the number of persons who may be relied upon to purchase their goods will continue to grow through an increase in the birth rate and through an extension of the normal life span. The sales curve of every manufacturer and merchant is expected to show an ever-rising tendency. When it does, business is normal or "good"; when it does not, business is "bad." Attention is concentrated more on the extent of the expansion of the business, than on its profit-making record. Sales managers are more interested in increasing the number of sales than in increasing profits, and under the influence of the exponents of "scientific salesmanship," "graphic presentation" and the other legerdemain of modern business there has grown up a host of followers of what might be called the "cult of the rising curve." The chief principle underlying their actions is the *naïve* belief that every business can continue to expand indefinitely, that the market for its products is indefinitely elastic, provided only that the right type of "spellbinder" occupies the sales manager's chair, that the right type of "sharp-shooting" salesmen cover the field, and that the right type of "consumer appeal" is embodied in its advertising.

THIS pseudo-scientific approach to the problem of finding an effective distribution of manufactured goods is one of the products of a "scientific" age, in which most high-school graduates are imbued with a sufficient superficial knowledge of the physical sciences to be interested in the quantitative analysis of everyday problems. This smattering of science carries over into business life, where it develops into an overemphasis on quantitative measurement, a craze for presenting facts in those ways which make the strongest visual appeal, a belief in the fallacy that things are better because they are bigger. Behind it all lies very little knowledge of or liking for scientific analysis, very little regard for evaluation and interpretation. So it happens that the salesman who does not sell more this year than he did last year, the sales manager who can not show larger gross sales this year than last, the president who can not show his stockholders a larger volume of business each year than in the year before are all, according to the current standard of measurement, called failures. Each one is required to exhibit an ever-increasing record of accomplishment, or stand self-convicted of unpardonable inefficiency. To such heights of absurdity have we been brought by worship of the rising curve.

Every intelligent business man wants to know as accurately as he can the extent of his market. He is naturally curious about its future, how big it will be,

how long it will last, how much it will demand. Intelligent business men in all lines of industry need that kind of knowledge; for many years some of them have been successful in acquiring it. In the field of public service the expansion of the investment in telephone facilities has been based on thorough quantitative analysis of such matters as population growth, which have a direct and very powerful influence on the future need for such service. Other businesses, whose future opportunities lend themselves almost as well to careful planning, ignore the opportunities for intelligent analysis and plunge headlong into unwarranted expansion on the theory that, because the sales curve has shown no flattening or drop, it must always continue to rise.

POPULATION growth and the distribution of the population according to age groups as disclosed by census data should serve as correctives of this tendency toward a blind reverence for the rising curve. The report of the Committee on Population Problems to the National Resources Committee made public last summer provided information that should interest the heads of all businesses which are more than purely local in scope. It showed that the population of the United States will reach its peak within fifty years and that at that time it will not exceed 158,000 000. Sixteen years from now, assuming no relaxation of the present restrictions on immigration, the peak will be only 139,000,000. It is estimated that the population will actually decline thereafter, the expected loss amounting to 10,000,000 in the following twenty-five years. If these estimates are even only approximately correct, they indicate that the future development of the market for goods, that are now consumed in more or less direct relation to the number of people that comprise it, can not be indefinitely expanded. While an indifference to long-time trends is characteristic of business managers generally, they should not ignore evidence that presages definite changes in the methods of business planning and conduct. Short-range decisions may be justifiable in times of economic stress but it should be evident to close students of industrial conditions that short-range thinking and the decisions of expediency that result from it are themselves largely responsible for the unbalances that make economic depressions seemingly inevitable.

Even when the population continued to show increasing rates of growth it was not reasonable to expect that every business or every type of business could expand indefinitely. The very fact that many businesses prospered was an invitation to other men to enter the same lines of industry, thereby increasing the facilities for producton but at the same time reducing the amount of business that could come to each existing enterprise. In many industries it has been true that the number of producing units has increased more rapidly than the market for their products, so that many businesses found themselves unable to survive their shrinking selling opportunities. To a greater extent than has generally been realized markets for individual products have been rather strictly limited by factors beyond the control of those who produced them. The number of potential users of the product, the number of those who could buy the product, the number and variety of competitive products designed for the same purpose, the number and variety of indirectly competitive products that bid for the buyers' interest, the prices at which the product was sold—these and many other factors placed measurable limitations on the market for it. Such being the case it was not possible indefinitely to increase the output of any producer's plant. In many industries it has been true —and to a great extent it is still true—that markets grow approximately as the population grows and that the greater the number of competitors trying to sell in them, the smaller the amount of trade that each can reasonably be expected to do.

THERE are limits to the quantity of food that a man can eat, and as the amount of physical effort expended by the average person decreases through the introduction of labor-saving machinery we may expect the average man's daily food intake to decline. There are limits to the amount of clothing that one can wear, to the number of houses in which one can live, to the number of motor cars, radios, electric utensils and other commodities that he can use. And the amount and number of the goods and commodities that each person requires or wants varies with his age, economic status, social position, intellectual standards, taste, habits, health, and other factors. Therefore, the distribution of the population among various classifications arranged in accordance with those factors sets definite, although perhaps not accurately measurable, limits to the expansion possibilities of most industries. Business men should not, therefore, remain indifferent to changing population trends on the theory that the country is so large, the people so numerous, their own ingenuity so great and their position so secure that it is reasonable to expect a continually rising sales curve.

Many business men who are engaged in the production of what have come to be known as capital goods may feel no interest in a problem that seems to be of concern chiefly to manufacturers and distributors of consumer goods, yet they should. Consumer goods are made in factories and by machinery that are capital goods and unless the business of their producers thrives, there can not be much prosperity for the producers of capital goods. The business man, whatever his product, will show wisdom if he watches closely the shifts in population and in its distribution that characterize the present period and will influence the future and if he also plans for the future with a full understanding of the truth that the market for his goods is not necessarily indefinitely elastic. If he does so, he will have less cause for astonishment or alarm when his sales curve shows signs of flattening or falling.

Construction Activity in 1938 at Highest Point in Eight Years

Construction activity in the United States during 1938 aggregated approximately $8,800,000,000, the largest total reported in any year since 1930, according to a preliminary estimate prepared by the Bureau of Foreign and Domestic Commerce of the U. S. Department of Commerce. The estimate, which includes new construction, maintenance, and work-relief construction, represents a slight increase over the revised total for 1937 of $8,675,000,000. It is based upon available data for the first 10 months of 1938. The increase in 1938 was the result of a gain of $540,000,000 in public construction, which more than offset the decline in private work. The movements of the preceding year were thus reversed—in 1937 the expansion as compared with 1936 was the result of a substantial increase in private work, while public expenditures for construction projects declined. Although the increase for the year 1938 was the fifth consecutive yearly gain, total expenditures for construction in 1938 were one-fourth less than the average volume during the decade from 1920 to 1929. The expenditures for public construction — including new construction, maintenance, and work-relief construction—have constituted a larger proportion of total construction expenditures since 1929 than during any previous period for which data are available. For the period from 1930 to 1938 governmental construction accounted for 43 per cent. of the total, compared with 22 per cent. during the decade from 1920 to 1929.

New construction within the United States during 1938 will reach a total of nearly $5,200,000,000, a slight decline from the previous year's revised figure of $5,340,000,000. The increase in new public construction during 1938 was not sufficient to offset a drop of more than $400,000,000 in private work.

The expenditures for new private residential building in 1938, excluding both residential construction in farm areas and all public residential work, and excluding also alterations, repairs, and maintenance, were estimated at $1,285,000,000, a decline of more than $100,000,000 from the 1937 total.

Factory building in 1938 was approximately one-third below that in 1937. Construction by industrial companies averaged $552,000,000 for the 10-year period from 1920 to 1929. This type of construction reached its low point in 1932, increased in 1933 and 1934, but declined again in 1935. Although large percentage advances were made in 1936 and 1937, the dollar volume of factory construction in 1937 was one-third below the average volume from 1920 to 1929.

Other types of private nonresidential building, such as educational, religious and memorial, hospital and institutional, and social and recreational building, declined moderately in 1938. In an active year (1926) these several types of construction amounted to almost $700,000,000; in 1933 and 1934 they amounted to less than $100,000,000 annually. The total in 1937 aggregated $189,000,000.

Total expenditures for farm construction of all types decreased approximately 8 per cent. in 1938 from the estimated 1937 total of $360,000,000. Public-utility companies spent approximately $500,000,000 for new construction in 1938, or 20 per cent. less than was spent in 1937.

Federal construction, including Federal aid for highways throughout the period, and Public Works Administration grants in recent years, rose from $168,000,000 in 1926 to $1,275,000,000 in 1936, declined slightly in 1937, but rose again in 1938 to an estimated total of $1,310,000,000. State and local government work also increased in 1938, totaling more than $1,000,000,000.

Highway construction and nonresidential building are the two most important items in the public-construction category. In 1938 highway construction work exceeded a billion dollars, compared with expenditures of $811,000,000 for this type of work in 1937. Nonresidential building, in which educational building is the most important, was estimated at $500,000,000 in 1938, a small increase over the 1937 figure. In recent years, outlays by the Federal government for conservation and development world have increased in importance. This type of work rose from $61.000,000 in 1926 to $338,000,000 in 1936 and exceeded $300,000,000 in both 1937 and 1938.

Expenditures for maintenance of public and private fixed works and structures have in general fluctuated less widely than new construction work. There was little change in the volume of maintenance from 1937 to 1938, and for both years maintenance was estimated at approximately $2,500,000,000. The major portion of these expenditures was accounted for by the repair and maintenace of residential and nonresidential buildings, railroad maintenance of way and structure, and highway maintenance.

In 1938, Federal expenditures for work-relief construction through the agency of the Works Progress Administration were estimated to be $1,000,000,000, a considerable increase over the preceding year and almost equal to the total expenditures made for work-relief construction in the peak year 1936. Approximately four-fifths of the total funds made available by the Works Progress Administration was used for direct labor costs. The major types of projects under this program, in order of importance, were: Work on highways, roads, and streets; expansion of public recreational facilities; work on public buildings such as schools and hospitals; and construction work on sewage systems and other public-utility projects.

Texas Cement Workers Sign with A. F. of L.

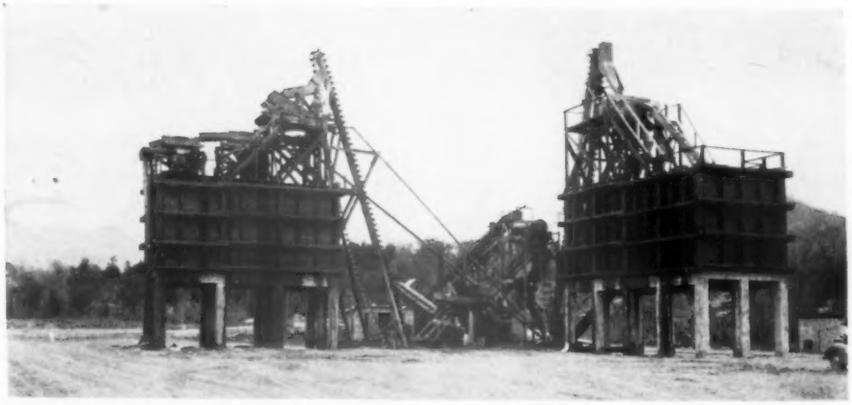
Workmen in the Fort Worth, Dallas and Houston plants of the Trinity Portland Cement Co. are reported to have signed a union agreement with the United Cement Workers, A. F. or L. affiliate.

Wages and hours will remain unchanged, it is said, the workers having gained paid vacations and established seniority and promotion scales.

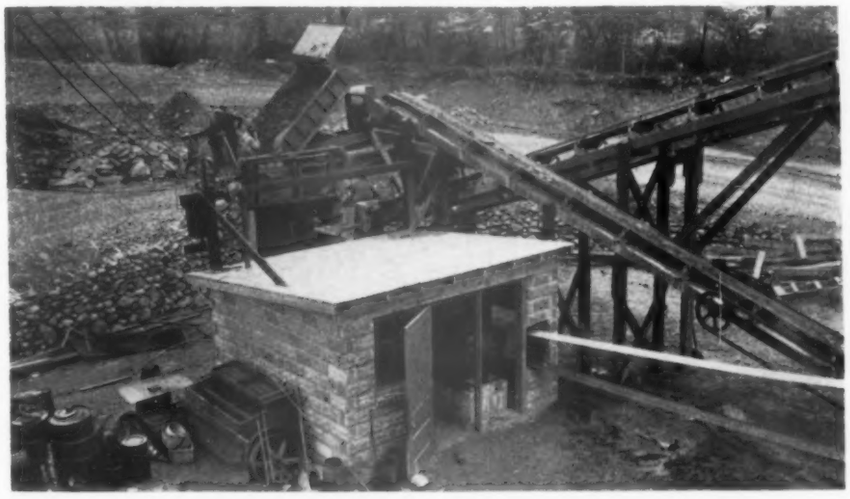
ICE Double Duty CONTROL
PREVENTS SLIPPING!
MELTS ICE!
★ Specially coated abrasive imbeds itself in slippery, icy surfaces. Keeps additional ice from forming! Will not harm concrete walks, lawns, clothing or home furnishings.
Phone Franklin 2571
TAMMS SILICA CO.
228 N. LASALLE ST., CHICAGO

Silica sand coated with calcium chloride is being sold in the Chicago area by the Tamms Silica Co., this winter. In order to acquaint the public with its value in preventing falls on icy walks, steps, etc., the company has been running a series of advertisements in the Chicago papers, one of them being reproduced above.

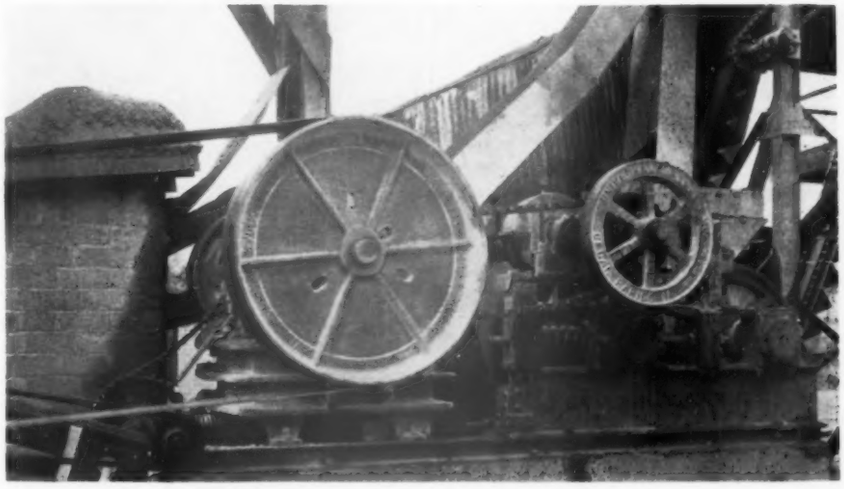
New Gravel Plant Has Same Capacity As Old, Uses Only Half the Power



The new plant of the Grove Stone & Sand Co., Grovestone, N. C. Sand and gravel are processed and stored separately in the buildings at left and right, respectively.



A truck dumping to hopper. Main conveyor and crusher-return conveyor are at right. The building houses the electrical equipment and the 75-hp. crusher motor.



The 10-in. by 36-in. jaw crusher and the 20-in. by 40-in. double-roll crusher with return conveyor at left. Chutes from screen are above.

A NEW sand-and-gravel plant of unusual design was put in operation early in April, 1938 by the Grove Stone & Sand Co. at Grovestone, N. C., on U. S. Highway No. 70 about 11 mi. east of Asheville. In designing this plant special provision was made for washing the product because of the high percentage of loam in the deposit. The final sizing of sand and gravel is done in separate departments. The entire operation carries the unmistakable finishing touches of a job well done.

The Grove Stone & Sand Co. was formed in 1924 and built a new plant shortly afterward. A complete description of this operation and of the improvements subsequently made to the plant was published in the July 30, 1930 issue of PIT AND QUARRY. In recent years the deposit had been worked out to a considerable distance from the plant and the equipment had become obsolete and expensive to operate and keep in repair. For this reason it was decided to build the new plant on a virgin deposit not far away. An interesting commentary on the development of processing methods and equipment in the eight years that elapsed since the article describing the old plant was published is found in the fact that the new plant produces nearly as much material as the old one and uses only one-half as much power. This record is the more remarkable because of the more rigid materials specifications now in force. Unlike its predecessor, this plant makes shipments only in trucks. State and county highways, city streets and private building take most of the product.

The present deposit, like the old one, is located in the basin of the Swannanoa River. The company owns 350 acres with little or no overburden. The deposit varies from 6 ft. to 20 ft. in depth, and averages about 30 per cent. sand and 10 per cent. loam. There are numerous boulders, some of which are sold for houses and gardens.

A Bucyrus-Erie 17-B crawler crane with a Caterpillar Diesel engine and a ⅝-cu. yd. bucket loads material from the deposit into trucks which haul it a distance of about 1,000 ft. to the plant. Three 1938 Chevrolet trucks with St. Paul bodies and hydraulic hoists carry about 3 cu. yd. of material per trip. These truck bodies have hood extensions to protect the drivers' cabs from damage by the bucket or large bowlders. Plates have also been welded on to

narrow the rear discharge openings to fit the plant hopper. The trucks have Russell special rear axles which give four speeds forward and three in reverse. Goodrich tires are used.

At the plant the trucks run up a transverse earth-fill ramp and straddle the 3-ft. by 7-ft. plant hopper into which they dump their loads. A 10-in. horizontal rod grizzly keeps occasional large bowlders out of the hopper and these are usually sledged through. A reciprocating-plate feeder discharges the material from the hopper on a 24-in. by 80-ft. inclined belt-conveyor, from which it is discharged through a chute into a 4-ft. by 8-ft. Universal revolving scrubber. The scrubber is equipped with baffle plates and water is added in the chute. Below the scrubber is a 3-ft. by 8-ft. Simplicity 3-deck scalping screen on which wire cloth with 2½-in., 1½-in., and ⅜-in. openings is ordinarily used. Chain Belt Rex sprays wash the material on this screen.

The gravel elevator and the screen used for final sizing. Note the chain drive of the elevator and the chain and belt drive of the screen from the elevator.

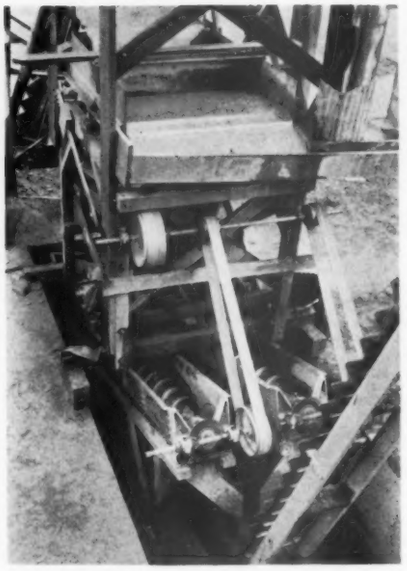
The oversize material from this screen is chuted to a Universal Crusher Co. 10-in. by 36-in. roller-bearing jaw crusher set for reduction to 1½-in. size and under. The material retained on the second deck is chuted to a 40-in. by 20-in. Universal double-roll crusher which is set for reduction to ¾-in. size and under. The products of both crushers are discharged on an 18-in. by 36-ft. inclined belt-conveyor, which returns them on the main belt-conveyor to the scrubber.

The ⅝-cu.yd. Diesel drag-line loading sand and gravel into one of the three trucks which supply the plant.

The ⅜-in. to 1½-in. material retained on the bottom deck of the scalping screen is chuted to an 18-in. by 60-ft. inclined chain-bucket elevator which carries it to the top of the gravel-sizing plant. A 3-ft. by 8-ft. Simplicity 3-deck screen with 1¼-in., 1-in., and ¾-in., openings makes four sizes of gravel, which are discharged through steel chutes into the four compartments of a 400-ton wooden bin. Trucks are loaded through two arc gates under each compartment.

The sand and water passing through the scalping screen flow through a flume, equipped with sprays to break up the clay, into a No. 67 Eagle Iron Works sand-settling tank. The discharge from this tank is split to a pair of Eagle 22-in. by 15-ft. single-screw washers. The dewatered sand from these screws is discharged to a 12-in. by 60-ft. inclined chain-bucket elevator, which carries it to the top of the sand-sizing plant. A 3-ft. by 6-ft. Link-Belt double-deck screen has ¼-in. wire cloth on the bottom deck. Coarser cloth is used on the top deck to break the force of the dropping sand. Chain Belt Rex sprays are used on this screen.

The jaw and roll crushers at the Grove plant. The scrubber, one of the screens and the sand classifiers are at right.



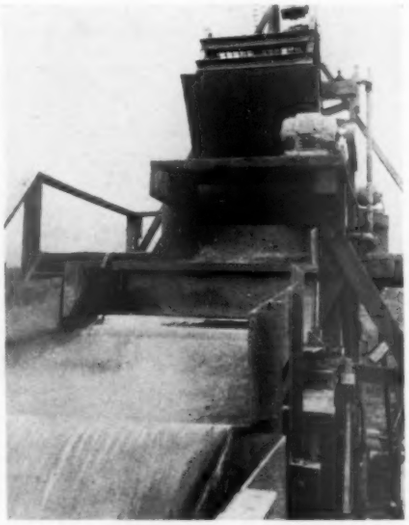
Looking down on the settling tank and dewatering screws which partially prepare the sand. Elevator in foreground feeds to the final sand screen and tanks.

The material retained on the bottom deck is roofing sand. The sand passing through the bottom deck goes to a series of two Eagle sand-settling tanks, No. 45 and 56. The product of the first tank is concrete sand and that of the second plaster sand. These three products are discharged into the three compartments of a 300-ton wooden storage bin. Trucks are loaded through gates.

Left to right are: Clyde Reed, operating manager; Geo. Brandon, foreman; Chas. G. Lee, secretary and treasurer; and R. Lee Ellis, president.

Concrete is used everywhere in this

(*Continued on page 34*)



The final sand screen which removes coarse roofing sand. The two settling tanks produce concrete and plaster sands.

Drilling Mud and Special Clays Are Produced at New Plant in Louisiana

The new plant of the Louisiana Boganite Co., Bogalusa, La. Drier and storage sheds for raw clay are at right.

This photograph was taken on the day the first carload was loaded for shipment.

The 5-roller, high-side mill in the Louisiana Boganite Co. plant.

THE ever-expanding market for special clays in industrial processes and for other purposes has resulted in the erection of many new plants in recent years for the production of this material. One of the newest of these is the plant of the Louisiana Boganite Corp., at Bogalusa, La., which went into operation in December, 1938. Some of the clay produced will be used in the manufacture of the company-owned Boni Facial cosmetics, particularly the Miracle Masque.

This new plant was built primarily to produce drilling mud for use in the oil fields in the southern states and in California. This material is obtained from a deposit, about 5 mi. southwest of the plant, which consists of a 96.6 per cent. chemically-pure natural clay. At a later date it is planned to produce refining and bleaching clays and other similar products. Deposits of suitable raw materials for these additional products are available within economical shipping distance of the plant via the main line of the Gulf, Mobile & Northern Rwy. on which the plant is located. Water shipments will also be made when the waterway from the Gulf of Mexico to Bogalusa, now under construction, is completed.

The deposit from which the plant is now supplied is worked by the open-pit method. A ¾-cu. yd. Brownhoist gasoline dragline removes the overburden, which ranges from 6 in. to 10 ft. in depth, and also loads the clay into trucks for haulage to the plant. The depth of the deposit is unknown but it has been drilled to a depth of 75 ft.

Chevrolet dump trucks are used to haul the material to the plant, where it is discharged into an end-dump steel car of 3-cu. yd. capacity. A hoist hauls this car up an incline to a track over the storage building, from which the clay is discharged into any of four ground-storage bins of 250-ton capacity each. Later separate bins will be used for the different types of clay.

The clay is shoveled by hand from storage on a 24-in. by 78-ft. horizontal belt-conveyor at ground level. A short steel-inclosed chain-bucket elevator discharges it into a 6-ft. by 40-ft. double-shell indirect-heat rotary drier which is fired by natural gas with a Venturi burner. The moisture content of the clay is reduced in this drier from an average of about 20 per cent. to about 12 per cent. or dry enough so that it loses its toughness. Another short inclosed chain-bucket elevator feeds the dried clay to a Williams hammer-mill.

A 38-ft. inclosed chain-bucket elevator deposits the hammer-mill product through a chute into a steel rough-storage bin of 25-ton capacity. The feeder of a Raymond 5-roll, high-side kiln mill withdraws the clay from this bin into the mill, which is equipped with an integral Whizzer separator. A gas-fired Raymond flash-drying system supplies heated air at a temperature of about 1,000 deg. F. to this mill. This reduces the moisture content of the product to about 4 per cent. The furnace for this drying system is provided with an adjustable inlet through which air can be drawn into the system in the desired quantity.

Besides the separator on the mill proper, additional separation is provided by an 8-ft. cyclone collector. A Raymond fan, direct-driven by a 50-hp. motor, draws the fine clay from the mill

into the collector. The material settled out by the cyclone is finished product and is discharged through special air-tight gates into the packer bin. The air is drawn from the cyclone through the fan and back into the mill. The return air is vented through a Clarage fan into twin cyclone collectors, which remove most of the extremely fine ma-

The hammer-mill which reduces the product of the drier, and the elevator to the mill-feed bin.

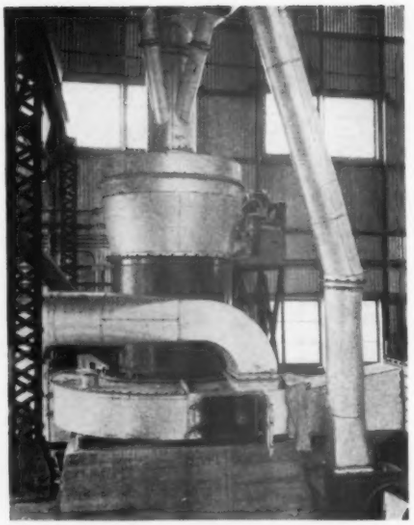
terial from the circuit and discharge it into the primary line to the large cyclone. This fan is direct-driven by a 10-hp. motor.

The fineness of the product of this system is governed to a large extent by the speed of the revolving Whizzer. In order to get the best possible results the Whizzer is driven through V-belts from a Reeves inclosed variable-speed transmission. This in turn is driven through V-belts by a 10-hp. motor. The Raymond mill is driven through Texropes by a 75-hp. motor.

The product is packed by a 3-tube machine into 100-lb. paper sacks. There is storage space in this building for about 300 tons of sacked material.

All the company's sales are handled by the Concord Sales Corp., Whitney Bank Bldg., New Orleans, La.

A view in the storage shed showing the conveyor and elevator which feed the drier.



Another view of the 5-roll, high-side mill. Hot-air intake from furnace at left; vent fan at right.

The plant is a compact, straight-line operation and is built entirely of steel and concrete with corrugated-metal siding and roofing. Space has been left in the main building for a second grinding-and-drying mill to double the capacity. All the equipment preceding the Raymond mill was designed to handle double the present load. All the bucket-elevators were furnished by the Chain Belt Co. and are inclosed in steel housings. The elevators and the belt-conveyor are driven through Link-Belt silent chains and the drier is driven through Reeves variable-speed control and a Link-Belt speed-reducer by a 20-hp. motor. Each piece of equipment is

The natural-gas-fired furnace of the flash-drying and grinding system. Elevator at right feeds from drier to hammer-mill.

driven by an individual motor, except the belt-conveyor and the elevator to the drier which are driven from the same 7½-hp. motor. The hammer-mill is driven by a 40-hp. motor through a flat belt and the bag-packer by a 20-hp. motor. Link-Belt idlers and Goodrich belting are used on the belt-conveyor.

Grove (from page 32)

plant for machinery foundations, hoppers, elevator pits, etc. The bins have monolithic-concrete bases, pillars and beams and the floors for the trucks are also of concrete. The bins, plant superstructure, conveyor and elevator supports, walkways and stairs are built of creosoted timber. The bins are braced with steel tie-rods. All waste and the water from the sand tanks, screws and bins are carried off through an underground drainage system.

The plant was designed by the Universal Crusher Co., which firm also supplied or made all the new equipment. It has an average hourly capacity of 50 tons of gravel and 30 tons of sand but

The unusually attractive office of the company which was built from bowlders taken out of the pit.

has produced an aggregate tonnage of over 100 tons per hr.

The main power unit used is a 75-hp. electric motor located in a concrete-block building which also houses the transformers and switches for the entire plant. This motor drives the jaw crusher through a flat belt. The roll-crusher and the return belt-conveyor are driven by chains from the jaw crusher. A 40-hp. motor drives a shaft through a flat belt. The gravel elevator, the main belt-conveyor, the scrubber, and the two vibrating screens are chain-driven from this shaft. A cable-controlled clutch makes it possible to stop the main belt-conveyor without stopping this motor. Another shaft is belt-driven by a 25-hp. motor and the two screw-washers are belt-driven from this shaft. The sand elevator is driven through a Link-Belt gear-reducer by a 3-hp. motor. The sand screen is driven by a 3-hp. motor through V-belts.

In keeping with its surroundings, the company's office building near the highway presents an attractive appearance. Bowlders from the pit were used in its construction. In this building is a Howe 60-ton truck scale on which all shipments are weighed. The company further expanded its operations in June, 1938 by installing a Dunbrik machine.

Attendance Records Broken at 1939 Convention of Sand & Gravel Assn.

WITH a record-breaking attendance the twenty-third annual convention of the National Sand & Gravel Assn. and the ninth annual gathering of the National Ready-Mixed Concrete Assn. opened with a joint session at the Netherland Plaza, Cincinnati, on Wednesday, January 25. Hon. James G. Stewart, mayor of that city, was present to extend a hearty welcome to the hundreds of men, who for the second successive year had come there for the stimulating effect of new ideas. They came from all parts of the United States, from Canada and Hawaii, and they participated in one of the most helpful and constructive conventions the associations have ever held. Open floor discussions largely displaced the conventional type of prepared-in-advance-paper meetings and as a result there was that free and spontaneous exchange of ideas and experiences that is the objective of all convention-program builders.

The mayor referred to the problems of the heavy-goods industries, those which produce the permanent buildings and long-lived machinery on which all business ultimately depends, and to the shrinkage in their annual volume from approximately 19 to less than 4 billions of dollars. For this reason, he said, men "are practically just trading dollars instead of making the kind of money that they ought to be making." He traced in interesting and humorous review the history of Cincinnati and dwelt on its importance in the nation as representing the achievement of the American ideal. In doing this he referred to some of the illustrious men who founded and developed the city and the many notables who had visited it. "We had a lot of splendid visitors," he said, "even before you came to Cincinnati."

J. Rutledge Hill, president of the gravel association, and James F. McCracken, president of the concrete association, addressed very briefly those assembled, and the meeting was under way.

Chester N. Gray, director, National Highway Users' Conference, opened his talk on *Who Foots the Bill for Highways* by stating that the total of motor vehicle taxes paid in 1937 exceeded $1,525,000,000, indicating that highway users alone foot most of the costs of highway building and maintenance and the retirement of highway obligations. Trucks alone paid in taxes of various kinds $417,500,000 as compared with $328,000,000 paid by Class I railroads. The motor vehicle taxes amount to 26 per cent. of the total value of all motor vehicles; the truck taxes reach nearly 48 per cent.

Mr. Gray commented on the widespread belief that highways and highway users are not regulated by the government. He quoted from the recent annual report of the Interstate Commerce Commission, referring to the Motor Carrier Act of 1935 and the Civil Aeronautics Act of 1938, as follows: "These two acts provide for the motor carriers and the air carriers, respectively, a system of regulation, which is, if anything, more comprehensive than that which has been provided for the railroads." This, he said, means that highway users in five years have become more comprehensively regulated than are the railroads with a half century of regulation behind them.

It is encouraging, said Mr. Gray, to note that the huge highway expenditures are not building up an overwhelming indebtedness. Comparing 1928 and 1937, he pointed out that the annual amount of state highway bonds issued has dropped from $121,000,000 to $65,000,000, and that redemption of highway bonds in 1937 totaled $76,000,000 as compared to $28,000,000 in 1928. Annual interest payments gradually increased from 1928 to 1933, but since then have shown a downward trend. It is also comforting to know that not one state is in default in highway bonds.

County and local road bonds show a similar condition, according to the speaker, and in the 10-year period from 1928 to 1937 the amount of such bonds issued annually decreased from $150,000,000 to $30,000,000. The amount of such bonds outstanding has been decreased during this period from a total of $1,500,000,000 to $1,180,000,000. In conclusion he said that the highway era is now on a pay-as-you-go basis.

Thomas S. Holden, Vice-President in Charge of Statistics and Research, F. W. Dodge Corp., spoke on *The Construction Outlook and Opportunities*. He said that in spite of the setback of late 1937 and the early months of 1938, last year's contract expenditures were nearly 10 per cent. ahead of those of 1937. The 1938 total was the largest since 1930 and the December total was the largest for that month since 1928. The Dodge record of total contracts in the 37 eastern states rose from a depression low of $1,256,000,000 in 1933 to $3,197,000,000 in 1938.

Mr. Holden regards the record of five consecutive years of construction increase as definitely a recovery record and a strong indication of continued improvement, in spite of the large part that Federal spending has played. That this recovery is not an artificial one, he said, is evident from the fact that the annual average of public construction expenditures during the past six years has been under the average of the preceding six years. The need for community improvements to supplement private construction is great and has not yet been fully taken care of.

The unusual factor in the situation, he said, has been the method of financing local improvements with Federal funds on an emergency basis. Proposals for placing such financial aid under a long-range program are now being considered and will probably be adopted by the Congress. It has also been proposed, said Mr. Holden, that a National Long-Term Credit Commission be set up to review the functions of government lending and spending. Such a move would be in line with the long-time policy of the Federal government to open opportunities for productive enterprise.

The Federal Housing Administration is, according to Mr. Holden, erroneously regarded by many as an artificial stimulant to construction. In his opinion, the F.H.A. is a much-needed reform which is taking home-financing out of the pawnbroker class and is a sound method of stimulating this type of work. Public subsidized housing, Mr. Holden believes, will be carried over into 1940. Some increase in public-utility construction was also predicted.

According to Mr. Holden, privately-financed construction began in September to run ahead of the same months in the preceding year and has maintained this lead. Last year's residential building total was the largest since 1930 and represents the fourth consecutive year of increase. The eagerness with which large life-insurance companies are now placing their money in F.H.A.-insured mortgages and housing projects is a sound stimulant which will

Ralph Hunt, Screen Equipment Co.; D. S. MacDougall, Spratlen-Brannan, Inc., Denver, Colo.; A. E. Fielding, Screen Equipment Co.; M. A. Farnham, M. A. Farnham, Inc.

become an increasingly-important factor.

The outlook for this class of building is regarded by the speaker as the most encouraging in recent years. He warned, however, against too rapid rises in material prices and wages, which might stifle this business, as most of it is in the low-cost brackets. As a matter of precaution the F. W. Dodge Corporation's estimates assume a moderate tapering off in residential building toward the end of the year.

Commercial and industrial building, said Mr. Holden, suffered most during the recent drop in general business because of its dependence upon business activity and sentiment. For the same reason, he said, this type of building should respond quickly to increased business activity. There is also a large amount of deferred factory building, as contemplated construction for the year totaled $257,727,000, while only $121,084,000 of contracts were actually awarded.

Mr. Holden described the recent recession as the type which shows very sharp declines and equally sharp recoveries. Price increases, labor wars, tax legislation and a tapering off of government spending were all responsible in this case, and the present recovery is an earned, rather than a planned, one. He predicted substantial improvement in private building and engineering operations which would overbalance declines in public-construction expenditures and cause a net gain in total construction for the year.

V. P. Ahearn, executive secretary, National Sand & Gravel Assn., closed the meeting with a *resumé* of *Business Conditions in the Sand-and-Gravel and Ready-Mixed-Concrete Industries*. He said that the time-honored custom of having 20 members of the association from various sections of the country give individual reports on the business conditions in the two industries had been found to consume too much time. This year the reports were sent to the association to be presented in one summarized report.

These reports showed, said Mr. Ahearn, that the volume of sand and gravel and ready-mixed concrete business in 1938 was about 10 per cent. below that of the preceding year. Missouri, Texas and Michigan showed increases and California held its own, but the other states followed the national trend. The combined opinion was that output in 1939 will show an increase of about 15 per cent., which would put it above the 1937 level.

The price level in 1938, said Mr. Ahearn, was no lower than in 1939 on the average. Prices are expected to be stable in 1939 and he also stated that, in his opinion, the two industries would think of prices in more rational terms than ever before. The reports showed that the 1938 demand for both products did not represent more than 50 per cent. of the capacity of existing plants.

These reports also showed that highways and streets continued to form the basis of the largest demand in 1938, but that the demand for large industrial structures and for housing construction was surprisingly good. There was a much better diversification in demand than in any other recent year and the demand for railroad ballast was weak in every section of the country.

About 75 per cent. of the demand in 1938 came from public works although in certain sections this outlet used from 65 to 90 per cent. of the output. Mr. Ahearn emphasized the dependence of these industries on government expenditures and said that producers should not lose sight of the possibility that this outlet might be suddenly curtailed. According to the producers reporting, the division of markets for these products will be much the same in 1939.

Emergency Federal appropriations formed the backbone of the sand-and-gravel and ready-mixed-concrete demand in 1938, accounting for about 50 per cent. of the demand. The situation this year is expected to be about the same. Only a small part of the public works was financed by states, counties and cities, and this condition is expected to continue.

Privately-financed construction accounted for only a small percentage of the total demand and no change is expected in this condition unless business improves sharply and the Congress continues to show signs of freedom from excessive domination.

The meeting on Thursday morning was presided over by E. Guy Sutton (Neal Gravel Co., Mattoon, Ill.), in the absence of Harold V. Owens (Eastern Rock Products, Inc., Utica, N. Y.). The first speaker was H. Herbert Hughes, Mineral Economist, U. S. Bureau of Mines. The subject of discussion was *Sand and Gravel Output and Outlets* and the facts and figures presented were illustrated by a number of charts and graphs.

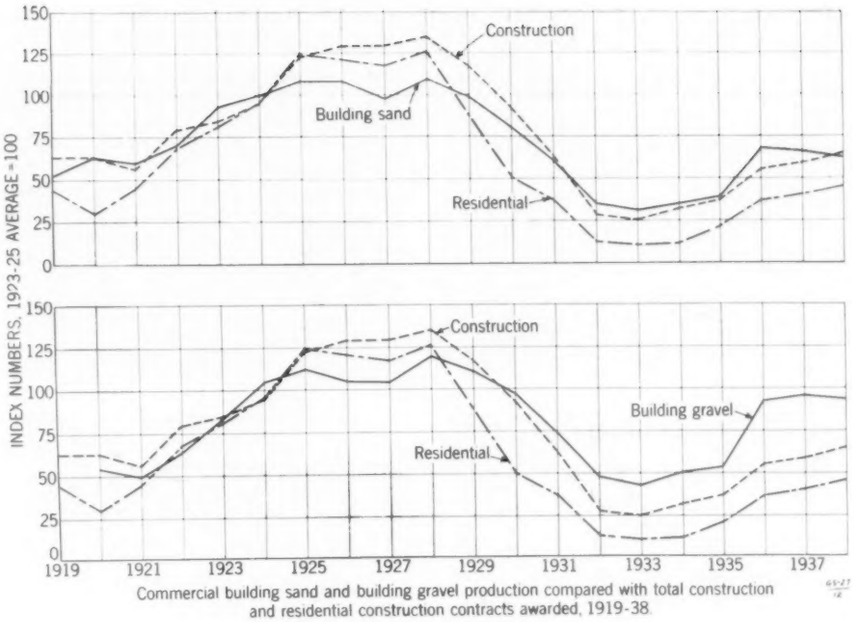
The volume of sand and gravel output in 1938 declined sharply compared with 1937, as did the index of industrial production, which was 22 per cent. under that of the preceding year. Sharp decreases were also shown for steel output, automobile production, fuel production, and many other indices of business conditions. Industries forming the principal outlets for sand and gravel, however, presented a more encouraging picture. According to Mr. Hughes, construction-contract awards based on F. W. Dodge Corp. figures, increased 10 per cent. over 1937; engineering-construction contracts advanced 14 per cent.; and concrete-pavement contracts awarded were up 5 per cent. Cement shipments and the domestic demand for asphalt were down slightly and there was an increase of 5 per cent. in the domestic demand for asphalt, the only indicator of activity in bituminous-road construction. Carloadings showed a decrease of 20 per cent.

Analysis of these data, according to Mr. Hughes, shows a decrease of from 5 to 10 per cent. in the output of commercial sand-and-gravel operations in 1938. No estimate was made for non-commercial production.

A more accurate comparison of monthly figures for the two years was also presented with charts adjusted for seasonal variation. These charts showed that industrial production in 1938 was

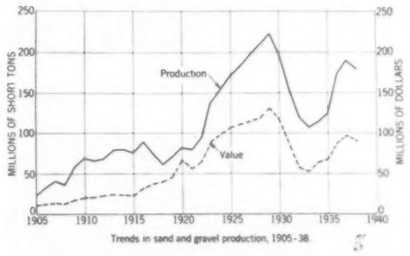
considerably below 1937 during the first half of the year but that in the second half of 1938 there was an almost exact reversal of the decline in the last half of 1937. Mineral production remained relatively high during 1938 but was below 1937 until nearly the end of the year. The level of construction turned sharply upward in June, 1938, and recovery in this field, according to the speaker, has progressed far more rapidly than in industrial production. Cement production increased gradually in 1938, going above the 1937 level in November.

Other indicators of sand-and-gravel markets, such as cement shipments, said Mr. Hughes, show the characteristic seasonal pattern with the volume of output of each nearly the same in the two years. Concrete-pavement contracts recovered from the low early in the year and engineering-construction contracts awarded in the last five months of 1938 were far above those



Commercial building sand and building gravel production compared with total construction and residential construction contracts awarded, 1919-38.

Fig. 3.



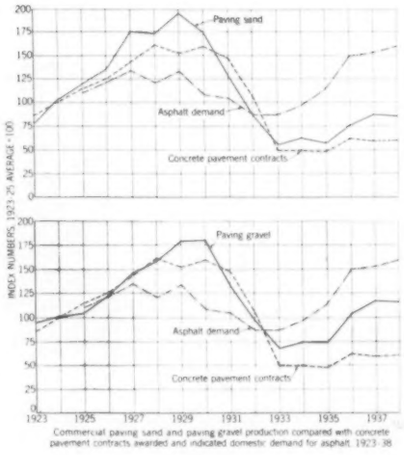
Trends in sand and gravel production, 1905-38.

Fig. 1. (All charts on this page supplied through courtesy of U. S. Bureau of Mines.)

of 1937, a reflection of government spending for public works.

"Looking more closely at the construction figures of the F. W. Dodge Corp., we find further evidence of public spending in the relatively-high level of the public-ownership and public-works curves. On the other hand, construction financed by private funds has been far from dormant, having exceeded 1937 figures in the closing months of the year. Of particular significance is the increase in residential construction in 1938 following the drastic slump late in 1937.

"The statistical record of the sand-and-gravel industry began shortly after 1900 when the Geological Survey first published figures on the output of glass sand (Fig. 1). The Bureau of Mines took over the job in 1925 when production was climbing to the peak reached in 1929. In 1937 the total tonnage again began to approach the 1929 level. In 1929, however, only a relatively-small part of the total output was reported by noncommercial operations—states, counties, municipalities, or other government agencies—whereas for the past few years about one-third has been

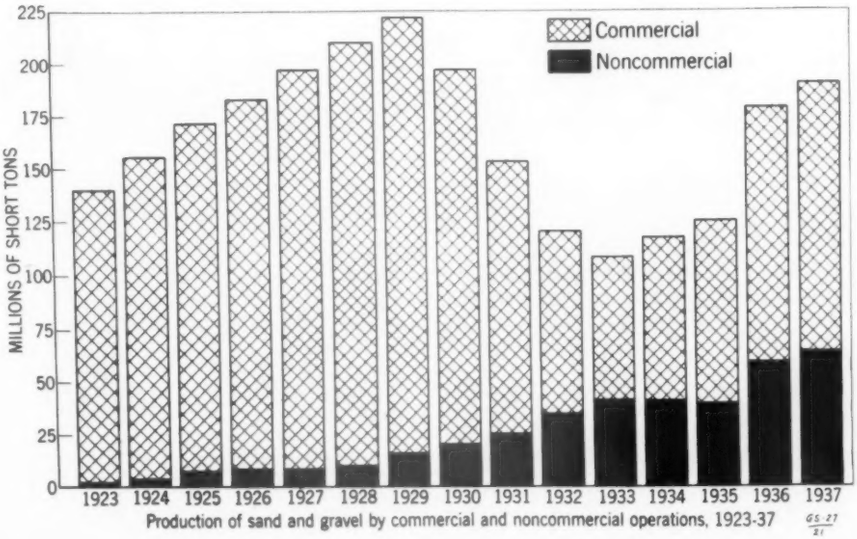


Commercial paving sand and paving gravel production compared with concrete pavement contracts awarded and indicated domestic demand for asphalt, 1923-38.

Fig. 4.

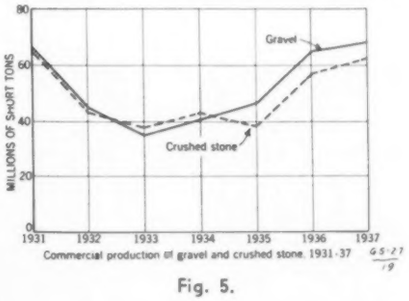
classed as noncommercial (Fig. 2). This record has now been carried back through 1923 and the situation in the early part of the period accentuates the rise in the past 10 years. . . .

"It is interesting to compare the volume of sand and gravel produced (commercially) during the past 10 years with the record of other industries as shown by data of the Federal Reserve Board. Sand and gravel dropped lower and recovered more slowly than industrial



Production of sand and gravel by commercial and noncommercial operations, 1923-37

Fig. 2.



Commercial production of gravel and crushed stone, 1931-37

Fig. 5.

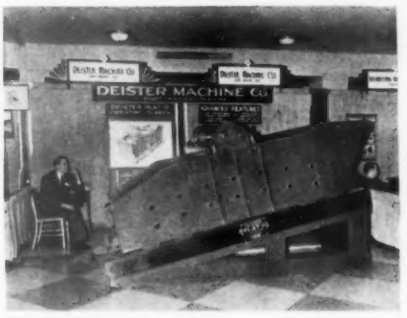
CINCINNATI CONVENTION EXHIBITS

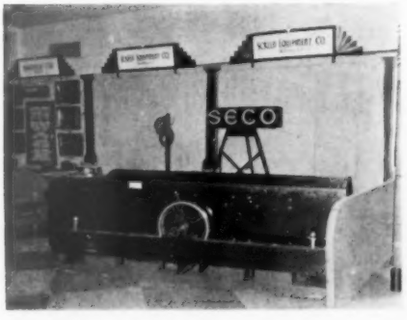
Reading down: A. Leschen & Sons; Link-Belt Co.; Robins Conv. Belt Co.; Allis-Chalmers Mfg. Co.; Manganese Steel Forge Co.

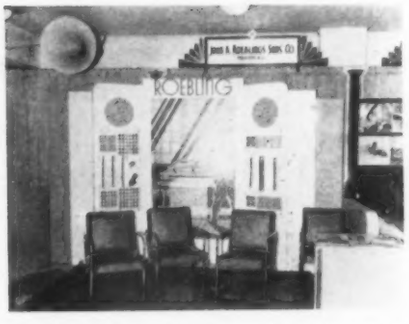
Reading down: Taylor-Wharton Iron & Steel Co.; Eagle Iron Wks.; Smith Engr. Wks.; Simplicity Engr. Co.; General Electric Co.

Reading down: W. S. Tyler Co.; Thew Shovel Co.; Traylor Engr. & Mfg. Co.; Pettibone Mulliken Corp.; Marion Steam Shovel Co.

CINCINNATI CONVENTION EXHIBITS







Reading down: Lima Locomotive Wks., Inc.; Hardinge Co.; Cross Engr. Co.; Barber-Greene Co.; American Manganese Steel.

Reading down: Deister Machine Co.; Kennedy-Van Saun Mfg. & Eng. Corp.; Bucyrus-Erie Co.; Screen Eqpt. Co.; Sauerman Bros.

Reading down: Nordberg Mfg. Co.; Hendrick Mfg. Co.; Pit and Quarry; International Harvester Co.; John A. Roebling's Sons Co.

production or mining as a whole. . . .

"These comparisons with other industries, although of general interest, have no material significance in evaluating conditions affecting sand-and-gravel output. Comparison with industries directly related to the markets for sand and gravel, however, presents an entirely different picture of the status of the sand and gravel industry. Both construction contracts and concrete-pavement contracts fell to somewhat lower levels than sand and gravel. The increased demand for gravel in bituminous roads balanced in part the drop in the demand for aggregates in concrete pavements. The correlation between sand-and-gravel production and cement shipments is extremely close. Engineering-construction contracts likewise parallel sand-and-gravel output. The rise in all types of construction in 1938 was due largely to the sharp advance in contracts awarded in the last quarter of the year, which should mean increasing activity in the markets for sand and gravel in 1939. The high level of road-oil sales has not meant much to commercial producers of sand and gravel, for any surfacing material used with road oil is commonly a pit-run product produced on the job.

"For the past 20 years the trend of building sand production has followed closely that of total construction contracts (Fig. 3). Residential contracts have fallen to a somewhat lower level. Building-gravel output, on the other hand, has gradually risen to a level considerably above construction, which apparently is indicative of an increased use of gravel in construction projects. Both total construction and residential construction increased in 1938 compared with 1937 but, as this advance was due largely to awards in the closing months of the year, a slight drop in the output of building sand and gravel is expected.

"Paving sand and concrete-pavement contracts have followed much the same course since 1923, but the rise in asphalt demand since the depression has tended to lift paving sand somewhat above the level of concrete paving (Fig. 4). The curve of paving-gravel production is relatively higher than that of paving sand and lies much closer to that of asphalt demand, indicating that bituminous roads are providing an increasingly important outlet for gravel.

"The total tonnage of gravel produced by commercial operations from 1931 to 1934, inclusive, approximately equaled the commercial output of crushed stone (Fig. 5). In 1935 gravel jumped considerably higher than crushed stone, due in part to the large quantity used in the Fort Peck Dam, and gravel production continued above crushed stone in both 1936 and 1937. . . .

"A drop of nearly 50 per cent. in molding sand production in 1938 is indicated. . . .

"The production of glass sand in 1938 apparently was off nearly one-third compared with 1937.

"Foundries, stone-finishing plants, and plate-glass manufacture are the principal outlets for grinding and polishing sand, the production of which dropped about 40 per cent. in 1938. Freight-car loadings provide a good indicator of the demand for engine sand, which dropped about 20 per cent. below 1937. The demand for railroad ballast also bears some relationship to freight-car loadings. . . .

Harry S. Price, Jr., and L. D. Conover, Price Bros. Co., Dayton, O.; Jos. H. Hicks, Kennedy-Van Saun Mfg. & Eng. Corp.

"The outstanding feature of sand-and-gravel prices, as reflected by the net sales realization reported by producers, has been their relative stability. There may have been local price wars and, possibly, the general level may have remained consistently low, but from a national standpoint sand-and-gravel prices have not fluctuated widely. A comparison of index numbers of building sand and gravel prices with the Bureau of Labor Statistics price indices for cement and all building materials brings out this point quite clearly. Commercial-gravel prices (average per ton, f.o.b. plant) since 1923 have varied only 2 or 3 c. above or below 60 c. a ton. Crushed stone has dropped from more than $1.00 a ton in the first half of this period to around 90 c. or a little more in the past few years. The trend in cement has also been downward, with a pronounced drop during the depression years. The general trend of prices of virtually all commodities in 1938 was downward. This indicates that sand-and-gravel prices throughout the year may have been about the same as, or slightly below, the 1937 level."

Frank H. Jackson, senior engineer of tests, U. S. Bureau of Public Roads, spoke on *Highway Research Affecting Aggregates*. He told briefly of some of the more recent trends in specifications for sand and gravel. The treatment of this problem has, in his opinion, followed almost a complete cycle. Several years ago it was rather common to ignore the basic inequalities of the raw materials from which the aggregates were produced and to write rather arbitrary requirements. It then became customary more and more to build specifications around the kind of material most readily available. Now, said Mr. Jackson, the pendulum is swinging too far in the other direction and specifications are being written without regard to local considerations. The reason for this return to former practices is, he said, the result of a feeling among engineers that more rigid requirements are necessary, even though some local materials may be eliminated entirely and more careful processing be required in others.

The results of research as a guide to more intelligent specifications for aggregates, have, according to Mr. Jackson, been disappointing. The reason for this he says is the lack of coördination, resulting in an unfinished picture. The fact that most tests are made to solve some local problem also contributes to this condition. The development of satisfactory concrete aggregates from materials available in some parts of the country has not been entirely successful, he said, and it is becoming increasingly evident that the effect of grading and mineral composition on

volume change has not been given sufficient consideration.

Much of value has been learned from research, said Mr. Jackson, but the combined experience of engineers and other workers in this field has had more effect on specifications. The experience of years has convinced engineers that more care is necessary in every phase of concrete manufacture, from the preparation of the aggregates specifications to the building of the structure.

The need for research on the use of gravel in various types of bituminous mixtures and for stabilization is also urgent, said Mr. Jackson. The accumulated knowledge on the use of gravel as a coarse aggregate in bituminous mixtures is about where that of concrete was 30 years ago.

Mr. Jackson then discussed the wide range of gradations permitted in existing specifications and the uniformity clause usually inserted for closer control of the gradation of aggregates coming from any one source. The practice of permitting a variation of only 0.20 either way from the fineness modulus of a representative sample he considers to be a distinct forward step. This requirement he believes can be met in general by producers without great hardship.

He also regards as a forward step the trend toward closer control of the grading of coarse aggregates, and he said that several states now require that coarse aggregate be shipped and stored in two separated sizes. This practice eliminates segregation in the cars and stock-piles and any slight extra expense to the producer is compensated for by reducing the amount of rejections by the user of the materials.

Mr. Jackson next took up the question of the amount of fines in concrete sand, especially the trend toward the requirement of more material passing a No. 50 sieve than has been customary in the past. Up to a certain point, he said, the coarser the sand, the stronger the concrete, because of the smaller quantity of water required. In order to insure good concrete, however, he advocates the use of at least 10 and preferably 15 per cent. of material that will pass through a No. 50 sieve. The growing use of high-early-strength cements has, in his opinion, resulted in leaner and harsher mixes, resulting in increased troubles from segregation and bleeding. The addition of more fine sand in such cases would eliminate the need for admixtures to obtain workability and other desired characteristics.

There is, according to Mr. Jackson, no true measure of workability and a concrete mix which seems entirely satisfactory in the laboratory will require more sand when used in the field.

A group of producers watching one of the many free movies advertising equipment.

The average concrete sand, said the speaker, has a fineness modulus of about 3.0, but in some southeastern states, where coarse sands do not exist, very good results are being obtained with sands which would not meet typical specifications. Sands with moduli as low as 2.0 are being used successfully, and the higher water content necessary is reduced to a great extent by the smaller amount of sand necessary in a mix.

In controlling the quality of gravel accelerated soundness and freezing-and-thawing tests are widely used, but attempts to correlate the results of such tests with actual service results have been unsuccessful, according to Mr. Jackson. It is becoming evident, he said, that the durability of an aggregate in service depends as much on the kind of concrete in which it is being used as on the material itself. Some satisfactory method of determining the amount of volume change of the aggregate particle is necessary to solve the problem. The abrasion test he considers of less value for concrete aggregate than the durability and soundness tests. The Los Angeles rattler test, however, is considered to be of distinct value as a measure of the suitability of aggregates for bituminous work.

Mr. Jackson went on to say that deleterious materials must be removed and he congratulated the industry on the progress that it has made in this direction. No satisfactory tests for soft materials has yet been developed but most specifications now list the maximum amounts of various types of deleterious materials that will be permitted. A satisfactory test is urgently needed.

He also commented on tests for the quality of fine aggregates and said that while the structural-strength test is a great improvement over older tests, it still leaves much to be desired, because it does not take into consideration such intangible factors as mineral composition, surface texture, etc.

Mr. Jackson also described the so-called "rational analysis" in use in the State of New York to restrict the percentage of non-durable minerals, such as kaolin. This restriction was made necessary because of trouble the state is having with concrete pavements in certain sections where local sands are of poor quality. This condition has made it necessary to build concrete pavements in two courses, using a local sand in the bottom course and an imported sand in the upper course.

He also commented on the widespread use of natural sand in bituminous construction and said that crushed gravel should be accepted on a par with competing types of materials, if it has sufficient fractured surfaces to insure stability. This market, he said, is worth considerable research and experiment.

In commenting on the prospects for the future he said that future investigations should be concerned with those characteristics other than grading. The new laboratory of the Bureau of Public Roads at Abingdon, Va., will provide ideal facilities for work along these lines.

The ensuing discussion was led by J. L. Shiely (J. L. Shiely Co., St. Paul, Minn.), in whose operations there is a surplus of the finer sizes of gravel. By agreement with local engineers it was possible to use more than the usual quantities of this material with a small amount of extra cement without a loss of strength.

Irving Warner (Warner Co., Philadelphia, Pa.) described his company's experiences in meeting three different

H. C. Rodgers, McCrady-Rogers Co.; R. P. McKenrick, Blaw Knox Co.; B. A. Rieth, Universal Atlas Cement Co.; L. B. Bishop, Transit Mixed Concrete Corp., Richmond, Va.

types of specifications for the states of Pennsylvania and New Jersey and Philadelphia and other cities. He predicted a greater trend toward more minus No. 50 and less plus ¼-in. material, leaving a ¼-in. to ⅜-in. grit, for which there is comparatively little demand. Equipment for reducing this material to sand, he said, has not yet been perfected. He also described tests made of the waste wash-water from plants, which showed that the loss of extreme fines was not appreciable, indicating that producers may some day be forced to make enough fines to meet future specifications. Stone sand, according to Mr. Warner, is very uniform because of the manner in which it is produced and sand-and-gravel producers must be prepared to furnish sand of equal uniformity.

J. R. Thoenen (Bureau of Mines) told about time studies made in 23 plants in the past year. These showed that shovels used for loading in the pits were delayed from 30 to 61 per cent. of their operating time by the hauling equipment. The hauling equipment in turn was delayed 35 per cent. of its time at both ends of the haul. He suggested that producers make time studies of their operations in order to reduce their production costs.

E. J. Nunan (Buffalo Slag Co., Buffalo, N. Y.), also commented on the method of rational analysis used in New York State and the changes in soundness test methods made by the highway department.

Stanton Walker, director of engineering of the association, then described the new laboratory of the National Sand and Gravel Research Foundation at the University of Maryland, which includes all of the necessary equipment needed to carry on the multitude of tests and researches the association is called upon to make. Mr. Walker also described the former laboratory in Washington. Slides, most of which were made from photographs taken by PIT AND QUARRY and published in the December, 1938, issue, were used to show the present facilities.

The Thursday morning session opened with a characteristically stirring talk, *A Business Man Looks at Modern Conditions,* by Colonel Willard T. Chevalier. The speaker cautioned his listeners against being "staggered" by their business problems. Business has always had problems. And, he added, those of the present period are no more serious, no more unfair or burdensome, than were those of former days, but, like the ticks which, according to the Arabian proverb, seem to each man to be like gazelles, to each one of us his own troubles seem to be the greatest of all.

He deplored the tendency of business men to think "only of to-day and to-morrow and next week and what is going to happen. That is why we are not planning ahead, and that is why the capital-goods industries are in the doldrums, and that is why your particular business isn't getting the breaks you would like to see it get."

The speaker drew attention to two types of business; "one is taking care of our immediate everyday needs, consumption business, a replacement business," he said; "the other consists of providing new facilities, of providing for growth and expansion, new things generally. . . . We have been organized and geared up to operate on about a fifty-fifty basis. The American has traditionally looked for about half of his business activity to the creation of new things and new facilities and providing for new people, and for the other half to the meeting of current needs, replacement, and all that sort of thing. The result is that, if anything happens to either one of these seriously to affect its volume, then we produce a corresponding effect upon the total volume of business that is to be done."

Colonel Chevalier said that the country suffers from a deficiency of the second type of business because of its day-to-day and month-to-month living. "Men have almost lost the capacity to be interested in what may happen ten years from now or five years from now, or even a year from now."

He spoke somewhat at length on the changes that have occurred in the nature of business. "You and I," he said, "were brought up in a generation that was taught that business was an individual's private affair by which he made money; that he found a place where he got tired of working for someone else and said, 'Well, I am going into business,' and that was a means of making an income which he thought would be more fruitful than working for someone else. Business was strictly a private affair, a matter of how one earned his income. He could get it by a profession or he could get it by working for a salary, or he could go into politics and get his feet in the trough, or he could go into business.

"Well now, business is not that at all, and never was, and the only reason we were able to feel for so many years that that was what business was was because we didn't have to worry about the other aspects of it. But . . . business is a clearing-house of services. Every business enterprise performs the very vital function of bringing together two groups of people — one called employees and the other called customers—and making it possible for those two groups of people to exchange their services and products, one with the other, so that both groups might live. That is what business is, economically and socially speaking.

"The enterpriser, the man of business, who sees an opportunity to go into business so far as he himself is concerned, translated into social and economic terms, sees a field of endeavor in which two groups of people can be brought together to exchange their services, and he goes in to provide that clearing-house, and out of its operations he earns a profit, which is the reward of his enterprise in having undertaken this social and economic service of bringing together these people and enabling them to make their living.

"Now, remember," he cautioned, "I am not saying anything about the motives or the objectives that must govern the individual. We all must think

first 'What is there in it for us?' That is the incentive that drives us to do these things. I am speaking only of the social and economic implications of what we do, and I am saying one thing farther, that if, for any reason, business as we understand it ceases to perform that function effectively, then the people are going to find some other agency by which they can exchange their services.

"How do we live?" he asked. "We live, all of us, not by our own wisdom or by our own strength; we live by the exchange of commodities and services. The day has passed when a man could go out and take a quarter section and become absolutely sufficient to himself and do all the things that he needed, and have the cloth that he needed for clothing spun on the site, and tan his own hides and make his own boots, and all that sort of thing. Those days are gone. We are living in a civilization of tremendous specialization, so that each one of us can do only one thing. . . .

"For one hundred years our country grew in an atmosphere where great natural resources were all about us, where every time we had a breakdown of the system that was in operation we could just go over the hills and open up free land, develop new resources, and do all those things that were necessary for a new generation to get a new start. We didn't have to worry. We could carry on our business of production, distribution, engineering and research, all those activities that we have looked upon as the activities of business, without worrying. If we didn't need 100 men, we let 100 men go. They would find something else to do. If we wanted to shut down a plant, we could shut down the plant. That was nobody's business but our own. It was our plant after all. If we could do away with the income derived from the operation of the plant, that was our business and nobody else's, because always the people could be absorbed in finding another outlet for their services. . . .

"I don't believe we are going to find it possible to neglect that consideration any more," he added. "I don't think it is going to be possible for us to take it for granted that when we don't provide in our own establishment an agency whereby our people can exchange their services for the things they need, we can say, 'Well, they will find something somewhere else.' We are not finding it true to-day. What we are doing to-day is taking our earnings and pouring them into public funds which are disbursed to support in idleness the people who have not been able to find a place to exchange their services. . . . In my judgment business and industry are facing this modern condition, that they have, in addition to the responsibility for producing and distributing at a profit the commodities that we need, the further obligation of so carrying on this proce.s that the largest possible number of people will find in business and industry the agency through which they can exchange the services they have to offer for the services they need.

"Now, this doesn't need to be a very shocking thing. There is nothing radical about that. It is simply a recognition of a condition that always has obtained but that we didn't need to worry about. . . . Now it has become one of our problems, and I have implicit confidence that, given an opportunity, American business and industry will solve that problem efficiently and to the satisfaction of everyone."

Colonel Chevalier then pointed out that this problem provides the subject matter on which idealists thrive and that the danger to our institutions arises from the fact that many of these idealists are men without scruples. He added that the days of "building fortunes by means of large capital increments are over." It will no longer be possible, in his opinion, to amass huge sums of money by capitalizing businesses on the basis of their peak earnings in prosperous years and then demanding that they earn a normal return on that inflated valuation. Neither will it be possible to accomplish the same thing by continually adding capital obligations without writing off old capital obligations. "We are coming into a period," said the speaker, "when it will not be possible to get rich by the simple process of manipulating the symbols and claims of capital. We are going to get rich only as we learn how to produce more wealth per unit of human effort, only as we add to the national income."

Edwin B. George, economist, Dun & Bradstreet, Inc., spoke at some length on the subject, *Technique of Investigating the Business System,* his paper dealing with the work of the Temporary National Economic Committee. The speaker asked first, "Why should there be a survey?" In his opinion, "business has its own torments. It is for the most part painfully aware of its lack of freedom respecting price and production policies, and frankly does not understand why there should be such an outcry over monopoly, save where ownership is single and perhaps arrogant. The first part of the answer is that those responsible for the inquiry have made a brave effort to live down the epithet of monopoly hunters. Once that illusion is disposed of, a more reasonable answer starts to emerge in the form of a realization that the course of progress in this country over the past decade has been rough indeed, and that whatever the causes of the ups and downs, they are still obscure. Cyclical fluctuations have become increasingly violent. Their primary consequences are idle men and idle capital. The secondary consequences are misery and latent dissatisfaction with an economic system that for the most part has served us well.

"This particular challenge is not to be turned aside by exaggerated accounts of business sin in the hands of theorists or a parading of its virtues by industry. The fundamental problem is not *who* is wrong, but *what* is wrong. The solution lurks somewhere in the integration of our multiple activities. Oddly as the thought strikes, this country was not built as a finished machine. It is

Henry C. Fraas, Jaeger Machine Co.; Frank M. Welch, American Aggregates Corp.; Ralph Baggaley, Jr. and H. C. Rodgers, McCrady-Rodgers Co.

W. A. Wilson, Pit and Quarry; Geo. R. Slowey, Quaker City Rubber Co.; W. H. Sanderson, Pit and Quarry. Seated: Paul R. Hobstetter, Quaker City Rubber Co.

rather the type of machine to which new and valuable parts are constantly being added without much attention to their effect on the general rhythm.

"It seems to be almost self-evident that if businessmen were put in charge of our national producing and distributing plant they would not tolerate for five minutes some of the poor tooling and coördination which they would find there. First, however, to supplement their experience, they would demand a detailed account of all the plant's equipment and operations. If it fulfills its original high purpose, that is the duty which the Temporary National Economic Committee is now discharging. As a nation we have no single manager nor do we want one, but in lieu thereof the democracy as a whole may be called upon to pass judgment on the evidence that is being produced. The issues are anything but academic.

"One of the main reasons for public concern is the increasingly heavy industrial unemployment characterizing successive business recessions. There is a strong tendency to assume that rigid prices and bigness are responsible. More pointedly, in some quarters these are looked upon as two words for the same thing, or at least as reciprocals.

"A judgment on these matters that is fair to both realities and theory is one of the most difficult assignments that any responsible body can be given. It is possible to amass huge stacks of evidence both that bigness and specialization have been guilty of imposing a pattern on industrial activity where there should be only flux, and that, had it not been for bigness and specialization, the country would now be lacking many of the joys and comforts it now boasts. . . .

"National policy has allowed a business man that freedom of judgment under which he may restrict his output and lay off some of his men, if necessary to preserve his own business existence. He does so and an equal anxiety arises over what should be done with the men who are displaced. As a people both industrially- and socially-minded, we have been taught in different chapters of the book that both these objectives are proper and compelling. Yet there is certainly a higher and healthier middle ground somewhere between them, if plodding human beings can manage to reach it. Divine help hasn't been more badly needed since prohibition days at least.

"I wonder if the following sequence of ideas may not at least suggest the situation with which the Temporary National Economic Committee and industry must jointly deal:

"1. Deliberate price fixing and other private controls over competition, corresponding to power rather than economic need, are habitual with some trades and industries. The rest of industry pays the cost long before it filters through to the consumer, and then pays again. Its suppression, or subjection to government supervision, is apt to be Point I on anybody's program. This is industry's own fight as well as that of the public.

"2. In many respects, however, our present anti-trust laws are homilies on a way of life that can never be fully achieved, and to which differently-situated industries respond in entirely different ways.

"3. Were business to be merely atomized, it would be like cutting down our national creative power so that the machinery would be easier to repair.

"4. Nevertheless, the machinery does get out of order with increasingly-serious damage to the national standards of living dependent on it. The increasing violence of business cycles, the increasing insecurity of employment, and the low utilization of productive capacity stand out among the direct injuries inflicted.

"5. Business will usually have perfectly good reasons for its actions, which is not to say that all the economic results of its actions are good. This conflict is a practical and not a moral one between accepted public and private interests. Its meaning is merely that correctives may have to be looked for along some other policy line than that of the anti-trust laws, and even that we may be obliged to take the risks of further experimentation.

"6. The country is engaged essentially in seeking a compromise between maximum production and personal freedom that will retain as much as possible of both.

"7. There is not much chance of a sound solution unless business is willing to put the real facts on the table and the government is willing to be realistic in dealing with them.

"8. To be completely callous about it, there is not much point in industry refraining from putting out the real facts anyway, because the government already has most of the worst ones. Resistance to their display will merely make them all the more prominent, much as illumination is increased in proportion to the filament resistance.

"9. The minds of some members of the committee will be open and impressionable, those of others perhaps fairly-well set. In either event there seems to be a good enough chance of 'net' objectivity to warrant an up-to-date effort at self-analysis. It is bound to be healthy anyway, whatever its relation to the inquiry. And it might be better, in the view of most of those who have started, to have an outsider do the job. It is as hard for an industry as for an individual to appraise itself, and there will naturally be less skepticism over the findings. Some industries have already begun, in this manner, to explore their own dark corners of erratic, random, and possibly wasteful operation. Two possible tests of operation in the public interest have appeared. One might be termed practical, and is concerned with the specific direct services that have been rendered to consumers, capital, labor, management, suppliers, customers, and government. The other is addressed to the industry's success or failure in "fitting" itself to the economic structure—its financial set-up, price and production behavior, cyclical history, and the focal points of its competition.

"10. For the first time in decades we might try to develop private, official, and public understanding of the true workings of competition as a basis for national policies that will help us preserve the good and get rid of the bad in a system that is still the most productive on earth. Law will never be realistic until it is given realities to deal with. Your own industry may not conform exactly to the *expectations* of the anti-trust laws. It may be doubtful that it could even if it wanted to. You might even smile at those who pointed out the divergences and asked you to erase them—smile or duck, according to who was doing the pointing and asking. Scores of other industries are in the same fix. *Why are these things so?* As matters now stand, most of the people who have occasion to deal with this tremendous subject do little more than strike attitudes when it is mentioned. Business men who are going happily about their affairs drop everything and assume a pose of injured innocence. Government stops governing and leaps into its familiar *rôle* of outraged virtue. Unless otherwise responsible and useful citizens quit playing charades, the inquiry could leave the country worse off than when it started.

"Every business man, every industry is going to be pulled and hauled by two imperious instincts. The one is to protect himself against unjust abuse. The second is to give his country all the help he can in achieving a more secure and comfortable scale of living. Amidst all the contradictions with which the inquiry will probably abound, there does seem to be at least a sliver of common ground in these two purposes which the troubled executive can occupy. He can throw his influence on the side of a thorough rather than a hasty job. A short investigation would hardly provide more than enough time to parade all the examples of iniquitous business conduct in which the government files are so rich. If business makes a determined effort to plumb the depths as well as map the surface of competition for the benefit of the investigators, the practical problems and headaches that cause industrial policies to be what they are might become as visible as the criticized policies themselves. By the same token any such drive toward realism should be a relief to legislators, who wish to find the best possible public rule for business guidance and yet can not be expected to imagine the pertinent facts that business fails to put forward.

"Perhaps this whole story is summed up in the statement that there is going to be an inquiry, that the committee's attitude holds out more promise of useful results than could ordinarily be hoped for, that the most vital facts are the hardest to get, and that for both its own and the national good business must supply a generous share of both facts and brains.

"The results won't be as bad as the disillusioned man thinks—nor as good as the idealist hopes for. To put the affair in its true place in history the proper remark is, 'Well, here we are again.' Once in each generation apparently we have to face an ordeal of this kind. It can be an irritating stalemate, but it can also be a healthy coöperative retooling of the same old economic plant, *provided* both sides are looking honestly for the truth instead of merely standing ready to bristle at whatever the other fellow finds first. There is one obvious rock-bottom fact than which there is nothing better as a starting point—neither of them can go alone and get anywhere."

The sand-and-gravel association's executive secretary, V. P. Ahearn, closed this afternoon's session with a detailed discussion of *Federal Legislation Affecting the Labor Relationship*. He spoke of the effects of the National Labor Relations Act, the Public Contracts (Walsh-Healey) Act and the Fair Labor Standards Act of 1938.

In talking of the first he emphasized the importance of the statutory protection it provides for the principle of collective bargaining. Although no proceeding touching either the sand-and-gravel or the ready-mixed-concrete industry has come before the National Labor Relations Board, the law has profoundly affected both industries because of the stimulation it has given to the labor-union movement. Its effects have been noticeable chiefly through the boycott technique in the membership campaigns of both the American Federation of Labor and the Committee for Industrial Organization. The use of the boycott by the craft unions composing the Building Trades Council of the A. F. of L. unionization has rapidly increased in these industries.

Among the agencies seeking modification of the act is the A. F. of L., which has taken a critical attitude because the board set up by the law has not adopted a policy favoring the principle of craft unionization, which is the foundation of that organization. Proposed amendments to the law would (1) make coercion from any source illegal, (2) allow employees to file petitions to form their own unions, and (3) relieve employers of the obligation to deal with unions which support their demands for collective-bargaining contracts by boycotts or jurisdictional disputes. Mr. Ahearn believes that the chance of modification of the act at this session of the Congress is small.

Regardless of one's objections to the act, Mr. Ahearn cautioned his listeners against a disregard of its provisions. As long as the present differences between the A. F. of L. and the C. I. O. continue there is the prospect of the use of boycotts, even though employers comply with the law's requirements. The large number of persons employed by the C. I. O. and its affiliates tends to perpetuate that organization as a separate entity.

The Public Contracts Act, more popularly known as the Walsh-Healey Act, applies only to Federal-government contracts amounting to more than $10,000. It sets the work-day and work-week at 8 and 44 hr. respectively and provides for time and one-half pay for overtime work. It exempts from these requirements employees engaged in office and custodian

Ray V. Warren, Western Pa. Sand & Gravel Assn.; Harry D. Jumper, Consolidated Rock Products Co., Los Angeles, Cal.; O. P. Steele, Transit Concrete, Ltd., San Francisco, Cal.; Wm. Moore, J. P. O'Connell Co., Boston, Mass.

work, watchmen, maintenance men, repair crews, foremen, engineers and electricians. While the law does not fix wage rates, it sets up a procedure through which prevailing minimum wages can be determined separately for individual industries or groups of industries. As explained in the report of the board of directors meeting, which will be found at the close of this article, steps have been taken to fix such standards for the sand-and-gravel industry. The standards for each industry will be determined independently of those set for others. Until such standards are fixed the minimum-wage provisions of the law are inoperative. Mr. Ahearn mentioned, in passing, that the total amount of contracts involved in the provision of materials to the government under the act in the period extending from September 18, 1936, to August 18, 1938, was $2,538,634 for the ready-mixed-concrete industry, $7,436,000 for the sand-and-gravel industry, $5,664,000 for the crushed-stone industry, and $1,000,000 for the slag industry.

Mr. Ahearn believes that this act is very likely to be amended by the present Congress, chiefly in the directions of reducing the $10,000 limit to $2,000, making subcontractors subject to the act if the value of their subcontracts are not less than $500 each, and requiring that companies which have refused to obey any order of the National Labor Relations Board shall be placed on a list making them ineligible to bid on government contracts. A proposed amendment covering these points was introduced in the last session of the Congress. Mr. Ahearn praised the temperate and efficient manner in which this act has been administered.

The provisions and implications of the Fair Labor Standards Act were then reviewed by the speaker. He talked in some detail about the questions of applicability raised by the provision mentioning interstate commerce. Administrator Andrews has ruled that the movement of raw materials across state lines to a company using those raw materials in the manufacture of a finished product sold exclusively in intrastate commerce does not bring the law into operation with respect to that intrastate commerce. The administrator has ruled also that the repair of instrumentalities of interstate commerce is covered by the law, but he has not yet ruled as to whether new construction of such instrumentalities is subject to it. Nor has furnishing of materials for the repair of such instrumentalities yet been ruled upon.

Mr. Ahearn pointed to the administrator's ruling in Interpretative Bulletin No. 1 on the question as to whether the act operates on employees or employers, quoting the administrator as

M. B. Garber, Thew Shovel Co.; and J. Rutledge Hill, Gifford-Hill & Co., Inc.

having said that "It thus becomes an individual matter as to nature of employment or particular employee. Some employers in a given industry may not be subject to the act at all; other employers in the same industry may be subject to the act in respect to some of their employees, and not others; still other employers in the industry may be subject to the act in respect to all their employees," except those exempted by Sec. 13. It is, therefore, not the nature of the employer's business but that of the employee's work which determines the applicability of the act. "Is that employee engaged in interstate commerce, or is he engaged in the production of goods for interstate commerce?" asked Mr. Ahearn. "If he is, the law applies in his case. If he is not, the law doesn't apply, even though that employer—the company by whom he is employed—may from time to time ship across state lines," said he.

With regard to the setting up of industry committees to determine wage rates, the associations representing the two industries have decided to withhold any recommendations to Administrator Andrews.

Mr. Ahearn mentioned certain exemptions on maximum hours. "Employees may be exempted from the maximum-hours provisions of the statute when they are employed pursuant to a certified agreement, whereby the employer, in my judgment, guarantees 1,000 hr. of employment during the period of 26 consecutive weeks or 2,000 hr. employment during a period of 52 consecutive weeks," he said. "Before such an agreement can be recognized by the administrator of the act the National Labor Relations Board must certify as to the *bona fide* characteristics of the union executing the agreement."

On the question of the possible classification of these industries as "seasonal" within the meaning of the act Mr. Ahearn referred to two regulations issued by the administrator, according to one of which an industry which met certain qualifications established by him could operate on the basis of a temporary exemption until December 31, 1938, and later until January 31, 1939. The requirements are that the industry must be engaged in the handling, extracting or processing of materials during a season or seasons occurring in regularly and annually recurring part or parts of the year. That industry must cease production, apart from the work of maintenance, repair work and clerical work in the remainder of the year because of the fact that, owing to climate or other natural conditions, the materials so handled, extracted or processed are not available in the remainder of the year. That industry must produce 50 per cent. or more of its annual output in a period or periods amounting in the aggregate to not more than 14 work-weeks. This last stipulation, coupled with the administrator's holding that the word "industry" applies, not to a single company, but to an entire industry or a well-recognized group within it, made it impossible, according to Mr. Ahearn, for the sand-and-gravel industry to qualify for a temporary exemption.

However, the absence of the 50-per cent. requirement from the qualifications necessary for a permanent exemption made it seem advisable for the industry to ask for consideration of its plea for permanent exemption. The qualifications for such an exemption require that an industry must show that it engages in the handling, extracting or processing of materials during a season or seasons occurring in a regularly and annually recurring part or parts of the year and ceases production, apart from such work as maintenance, repair, clerical and sales work, in the remainder of the year. Mr. Ahearn pointed to certain sections of the country—such as Texas, Florida, Louisiana and California—where the industry does not qualify and certain other sections—such as Minnesota, Wisconsin, New England and the northern parts of New York—where it is impossible to operate during certain fixed parts of every year because of the inaccessibility of the raw materials due to climatic conditions. In any case, however, there must be a specific ruling by the administrator before any seasonal exemption becomes operative.

Mr. Ahearn drew attention to the fact that the act does not apply to truck drivers engaged in interstate commerce so far as maximum hours of work are concerned, because these fall within the jurisdiction of the Interstate Commerce Commission through operation of the Motor Carrier Act of 1935.

George E. Martin of the Barrett Co. led the discussion of *Sand and Gravel in Bituminous Mixtures* at the Friday morning session. He referred to the changes that have occurred in bitumi-

nous-road construction. The early mixtures used crushed stone, whereas in recent years gravel has been utilized, first in areas in which crushed stone was not economically available. The gravel used in the early years was largely pit-run material, he said.

He spoke of the advisability of promoting the use of gravel in those types of road surfacing where gravel can be used satisfactorily and where it may have definite advantages. The question of whether the gravel should be crushed or not and the amounts of pit-run material that can be used are subjects of interest and importance.

The speaker thought that there is no market for gravel in the laying of old-type penetration macadam, in which the strength of the road depends on the interlocking of the aggregate. Among types of roads in which gravel can be used satisfactorily he mentioned those in which dependence for stability is placed on the packing or filling of the voids. In all these cases, both plant mixes and road mixes, the regrading is a definite requirement that makes the use of gravel satisfactory, he said. Mr. Martin said, too, that there are "a few places and a few types of gravel that have been used successfully in the open mixes."

B. E. Neal (Neal Gravel Co., Mattoon, Ill.) said that, especially in the northern part of the country where there is considerable freezing and thawing, there is less breaking of material under traffic after the pavement is laid, if the mix does not have an excess of interstices of angular material, a statement with which Mr. Martin agreed, although he would not go the length of saying that the breaking is detrimental.

Mr. Martin said there is a tendency toward tightly closed surfaces. Massachusetts, he said, still builds a very open type.

Etheredge Currie (Thomas Currie Co., Detroit) mentioned the competition between portable and stationary plants, stating that the stabilized-road-base program of Michigan has resulted in the loss of considerable business by the stationary plants because of the plenitude of local gravel. The specifications for oil aggregate are drawn so loosely, in his opinion, that the material coming from an ordinary deposit can be passed through an ordinary screening apparatus and conform to present requirements. Some of this loss has been offset, he said, by the ability of the stationary plants to furnish 100-per cent. crushed gravel for some of the higher types of wearing surfaces.

The speaker added the statement that he believes low-cost road programs have made aggregate producers out of numerous contractors who in former years engaged only in concrete construction but who now, in the absence of enough of that work to keep them employed, have bought portable plants and begun the production of material for bituminous construction. He fears that when and if the bituminous program wanes, these contractors, by slight changes in their portable plants, may use them for the production of concrete aggregates. The Michigan program involves over 200 mi. of bituminous construction, he said.

W. L. Smith (Memphis Stone & Gravel Co., Memphis, Tenn.) said his company had met this situation of portable-plant competition in his state by "putting our own small plants in the field, which we can vary, depending upon the type of oil aggregate."

With respect to 100-per cent. crushed gravel Mr. Martin said that it has not been used to any extent in the smaller sizes—the cover sizes. For cover material he does not consider it necessary to use 100-per cent. crushed material.

F. J. Cloud (W. R. Bonsal Co., Lilesville, N. C.) told of the preference of his state's highway commission for crushed stone and how some research work done by the national association on this problem had brought relief. The state department has found that gravel makes a good bituminous surface treatment and in recent specifications for this type of work the percentage-of-wear tolerance in the Los Angeles rattler has been increased. The specifications give 10 per cent. more wear tolerance on gravel than on stone.

J. Rutledge Hill (Gifford-Hill & Co., Inc., Dallas, Tex.) stated that in Texas and Louisiana it has been demonstrated that it is immaterial whether the aggregates are crushed or not.

The discussion of *The Use of Sand and Gravel in the Stabilization of Highway Bases and Surfaces* was led by F. V. Reagel, engineer of tests, Missouri State Highway Dept. He stated the stabilization problem briefly as that of providing more miles of paved roads with no more money than was originally available. Much money has been spent on "relatively few miles." "Now," he said, "we have a great many miles to take care of with about the same amount of money."

Mr. Reagel said that "there is more stabilization of the clay-gravel type going on than of all other types combined. The tendency is to use that type, or clay-stone, where the aggregates are economically available. I would say that the bituminous type is more or less selective for the areas in which aggregates are scarce." He told of some sections where soil 4 in. thick had had no aggregate added. He doubts whether much work is being done in conditioning clays to make proper binders for use in clay-gravel.

With respect to the use of calcium chloride he said there is a possibility that it will cause a flocculation of the clay and make a different material out of it than it was before that material was added.

Mr. Reagel said that the cost of bituminous-stabilized roads built of material containing 50 per cent. aggregate based on the 10-mesh sieve and having a $1,000 or $1,200 armour-coat surfacing is about $7,000 a mi.

Ray Giddings (Calcium Chloride Assn., Detroit) said that the "amount of work that the state highway departments are doing is but a drop in the bucket to the amount of aggregate that is destined to be used in road construction, because the adoption by the state highway departments of this relatively-new science evidences very convincingly its advantage over the use of soils as we find them in nature. Certainly when you are in the business of refining aggregates it is only one step further to stabilize them.

"As the state highway departments have only about 10 per cent. of all the roads in the United States and, further, in view of the fact that the national demand is growing for the extension of our highway improvements, and due to the fact that our county engineers, city engineers and the like are simply not in a position to go into the higher branches of testing and manipulating and that they don't have the equipment available to the states, we have come now to the point where, if we just get to work on the well-financed unlimited market in these highway divisions that have got to come to the aggregate industry for this improvement, we will get something. If not, they are going to turn to some other form of soil improvement which gets along without aggregates and some of these are being developed. There is a wide field for aggregate production of an improved product in the stabilized material."

Toward the close of this session of the convention those present reëlected J. Rutledge Hill (Dallas, Tex.) as president, Paul P. Bird (of Boston) as vice-president, and H. S. Davison (of Pittsburgh) as secretary-treasurer. Charles M. Cadman (of San Francisco), M. A. Neville (of Lafayette, Ind.), George W. Renwick (of Chicago), and John M. Settle (of Louisville, Ky.) were re-elected to serve with the officers as members of the executive committee.

The entire afternoon of the last day of the convention was devoted to a frank discussion of labor problems as they confront the sand-and-gravel and ready-mixed-concrete industries. The extent of unionization, the type of union involved, the extent of unionization among producers' customers, the use of boycotts, the kinds of agreements made with labor unions and their provisions with respect to closed or open shop, check-offs, arbitration, jurisdictional disputes, overtime, etc., were among the many subjects discussed. As each speaker was asked to describe his situation in detail, he was promised protection against individual quotation both in the associations' reports and in the press.

On the day prior to the opening of the convention the board of directors met and gave careful consideration to some of the many problems confronting the sand-and-gravel industry.

In his report covering the association's activities during the last half-year, Executive Secretary Ahearn discussed briefly some of the signs favoring a hopeful outlook for the industry. He referred to the growth in construction and the importance of government work to the industries furnishing the materials of construction. He spoke of the association's work with respect to freight rates and of its studies of labor relations. The policies of the Federal government in purchasing, the problems arising under the Fair Labor Standards Act and the (Walsh-Healey) Public Contracts Act and the Federal investigation of the business system were also discussed. He pointed out that the cost of the association to the sand-and-gravel industry was only 0.03 per cent. of the value of the entire industry's 1937 output.

Stanton Walker, director of engineering for the association, went into some detail in recounting the work done by his division. He told of its coöperation with other organizations, technical societies in particular, and of the technical publications which the organization had issued. In the latter connection he referred to his preparation of the chapter of *Specifications for Mineral Aggregates* for the 1939 edition of Pit and Quarry Handbook. Mr. Walker promised the board the fuller description of the engineering division's activities at the laboratory at the University of Maryland that has been mentioned above.

In his report on the financial condition of the association Mr. Walker mentioned a survey of 70 producers, whose output of 23,006,793 tons in 1937 had fallen to 19,667,914 tons in 1938 a weighted-average decline of 14.7 per cent. and an arithmetic-average decline of 13.0 per cent. Twenty-two of the 70 companies showed increases averaging arithmetically 22.6 per cent., while the 48 companies showing increases experienced an arithmetic-average expansion of output of 29.3 per cent. The changes showed no significant geographical differences.

In the matter of the association's application for exemption of the industry's "seamen" employees Mr. Ahearn reported that the administrator has not yet given a decision. A request for permanent exemption of the industry because of its seasonal character has been made. L. Metcalfe Walling, administrator, Public Contracts Division, Department of Labor, has asked the association (1) whether it will be necessary to establish many geographical differentials in determining prevailing minimum wages or whether those set up under the N. R. A. code would suffice, and (2) whether it would be necessary to distinguish between metropolitan and rural areas in each of those zones. It was the feeling of the board that the three zones of code days would be enough and that it is not necessary to set up urban-rural differentials within them.

It was decided to hold the association's 1940 convention at the Jefferson Hotel, St. Louis, Mo., on January 24 to 26, inclusive. The place and time of the mid-year board of directors' meeting will be decided by the executive committee.

At one point in his remarks Mr. Ahearn pointed out that over 70 per cent. of the production of ready-mixed concrete is attributable to the producers of sand and gravel.

Ohio Group Meets

The Ohio Sand & Gravel Assn. held its annual meeting and lunch on Wednesday, January 25, in conjunction with the annual convention of the National Sand & Gravel Assn. at the Netherland Plaza, Cincinnati, O. Among the business transacted was an amendment to permit equipment manufacturers to take out associate memberships. It was also decided that the association take no action on the proposed state wages-and-hours law, and the members also voted to continue their participation in the safety contest conducted by the industrial commission of Ohio. Wm. Edward Hole (American Aggregates Corp., Greenville, O.), was reëlected president and all other officers and directors were also reëlected.

Claude Clark, secretary of the association, commented briefly on the prospects for the industry in Ohio for 1939. The P.W.A. and the W.P.A., he said, will continue to be important factors, and the state highway department is committed to the expenditure of $39,000,000 for new highways and maintenance work. He also said that the specifications for 100-per cent. crushed gravel for certain types of work will make it necessary for producers to equip their plants for the production of more fines. Mr. Clark also commented on the fact that in 1938 22 of the 33 millions of dollars collected in vehicle and gasoline taxes were diverted to purposes other than road work.

Opposes Gasoline-Tax Diversion in Florida

Opposition to diversion of gasoline-tax funds to purposes other than highway improvement is contained in a report submitted to the Florida Federation of Labor by a special committee charged with studying labor's attitude toward taxation.

"The ease with which 'hidden taxes' can be imposed and collected has resulted definitely in governmental extravagance," the report says.

"If taxes were imposed where the consumer could see them; and if service taxes were used for a definite purpose, such as gasoline taxes to be used only for roads and other necessities of vehicular transportation; if in short, the consumer were permitted to know what taxes he is paying, and for what purpose they are being used, there would be a speedy reduction in governmental expenditures and a consequent reduction in taxes."

More than one-quarter of the total automotive tax receipts of Florida in 1937 was diverted to non-highway purposes, according to the U. S. Bureau of Public Roads.

New Roofing-Granules Plant Starts Operating

Operations are expected to start about February 1 at the new $350,000 roofing-granules plant of the Staso Milling Co. located at Bound Brook, N. J. The plant, consisting of nine separate buildings, was built under contract by the Austin Co. of New York, N. Y. The Staso property adjoins that of the Bound Brook Crushed Stone Co., from whom it will obtain its raw materials. The site is also near a number of potential customers such as the Johns-Manville Co. and the Ruberoid Co.

The Staso company is said to be the largest producer of crushed stone, slate, etc., for the prepared roofing industry. Besides the new Bound Brook plant it has factories at Castleton, Vt.; Hampton, N. Y.; Whiteford, Md.; Whitestone, Ga.; and Jedburg, Mo.

Performance Measurement and Mechanical Control

By ROBERT W. ROTHROCK
Chemical Engineer

CONSTRUCTION materials and chemical products made to-day from nature's raw materials surpass earlier similar products in many ways. Despite this fact, whether it is generally realized or not, all producers of nonmetallic minerals are confronted with the problem, What further improvement can we make?

Among the possible economical and practical means for locating and developing opportunities for improvement is the broader application of devices that reduce dependence upon the human element for control purposes.

Control in some manner must be exercised in every industrial manufacturing process. A variety of reasons make control necessary. Two that stand out as the primary aims of any operation are market demand and profit. The market usually specifies and demands a product of definite character. The manufacturer must meet this demand in order to sell his product and he must do it at a profit in order to survive.

Though profit is necessary for survival, immediate profit is only one of the numerous ultimate objectives of control in industry. Industry must not only survive for the existence of our present generation but it must endure for the existence of future generations.

Almost everyone realizes that the raw materials taken from nature for the manufacture of mineral products can not be replaced by any effort of man. We know, too, that, though there seems to be an abundance of raw materials, the supply of known satisfactory materials will likely fall far short of meeting the needs of our people for more than a very small fraction of the time to which we look forward, as the expected life of our nation. Any program of operation would do well to include methods of control aimed at prolonging the availability of raw materials.

In the past merely to have a product for sale was perhaps enough. However, the relatively simple problems of production and markets which needed solving only a few years ago have been and are becoming more and more complex. Competition is more intense, wages are higher, markets are more exacting and, at the same time, demanding greater dollar-for-dollar value. These and other factors combined with a greater expansion in production, enter into creating a necessity for finding ways of reducing production costs in order that profit may be made upon continuously increasing investments.

Keeping production costs at the minimum requires, among other things, some measure of equipment performance. This means making certain through exact measurements that each unit is turning out a quantity of material consistent with its most profitable capacity. Along with this, the proper quality of product measured in terms of the market demand must continuously be produced. The conditions under which quantity and quality are most economically obtained should be known and maintained. In modern manufacturing procedures must also be carried out in a manner that assures safety to the employees.

Old-time guesswork, though it may have been adequate in traditional procedures, fails to give the information necessary for control in modern progressive industrial practice. There is a necessity for definite and exact information, a need for planned measure of every unit in operation.

Alert executives guiding the destinies of business know there is never a "standstill" period in industrial development. Therefore, they should have available at all times accurate records of plant performance in order that they may reflect upon past experiences and reconstruct them in terms of present experiences, particularly when planning future expansion or the building of new plants. For the most successful outcome of any planned expansion, accurate information obtained through definite performance measurement is fundamental. Even though expansion is not the immediate goal, the profit derivable from the finding of better ways of performing routine operations is of considerable significance. It is through improvement in routine operations that plant equipment and operations are most effectively adjusted to changing markets as well as to the changes brought about by the continuous reconstruction of our social and economic order. Certainly control is a major problem for a profitable existence.

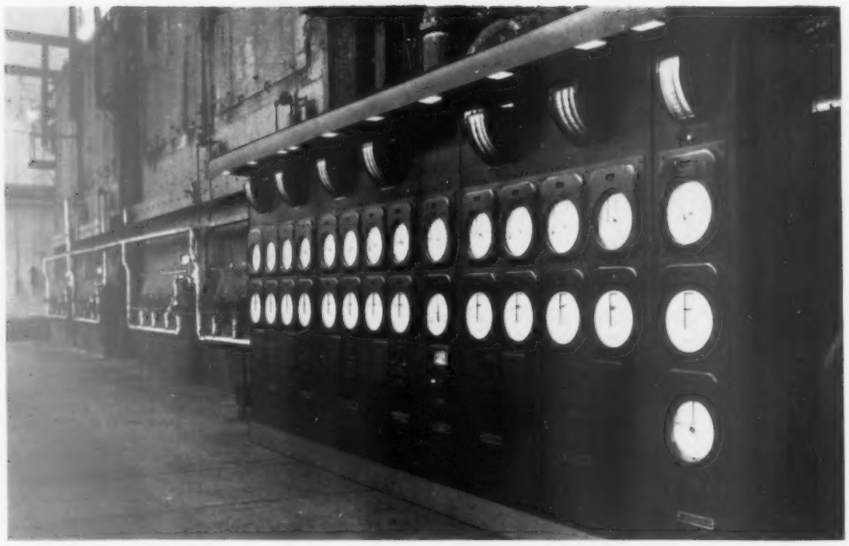
To realize the significance of instrumentation as a necessary service one needs only to make a mental survey of a few industries with which everyone is in a way familiar; for example, the automobile industry. The essential and significant measurements in this industry are made by instruments. Mechanical measuring devices are applied in every step of the automobile's construction. They are used and manipulated by, or serve as guides in the manufacturing process for, almost every worker. Even large research units have been organized to develop new instruments and new applications of older ones in order to make the automobile the smooth, quiet-running vehicle it is to-day. Typical in exemplification of control in some of the many industrial operations which produce materials that enter into building the automobile are shown in Fig. 1.

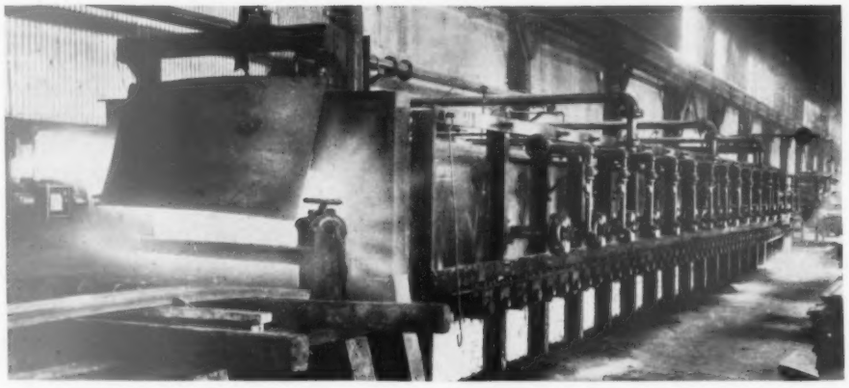
In many instances control is automatic. At least it is arranged mechanically to correct any faulty condition as promptly as it occurs. By thus decreasing the time intervals between successive processing fluctuations to a period much less than is possible through manual control alone the probable existence of many kinds of unobservable defects that cause failure of parts after the finished automobile is in use has been materially reduced. The motor-car driver to-day rides with a much greater feeling of safety than ever before because of critical production-performance measurement.

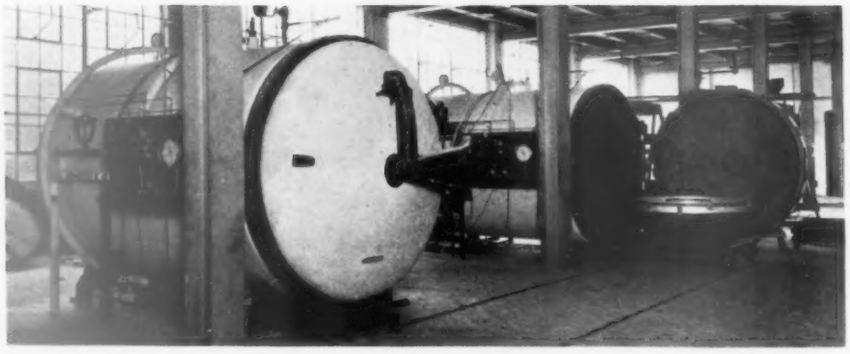
Similarly, instruments have contributed to a host of other major industries that are essential to our well-being.

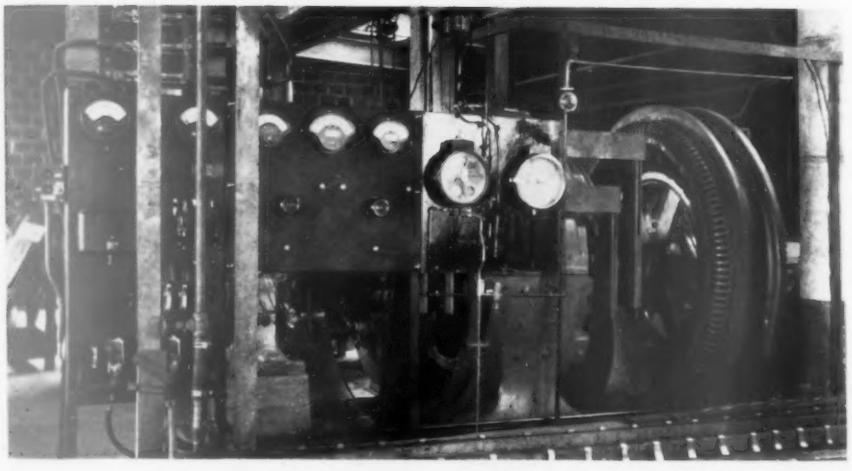
Some nonmetallic-mineral producers have tried to adapt types of measuring devices which have been quite successfully applied in other and kindred chemical industries. However, only a limited number have secured equally satisfactory results. Consequently, numerous producers derive little benefit from instrumentation other than meeting the requirement of law for safety in boiler operation and the like.

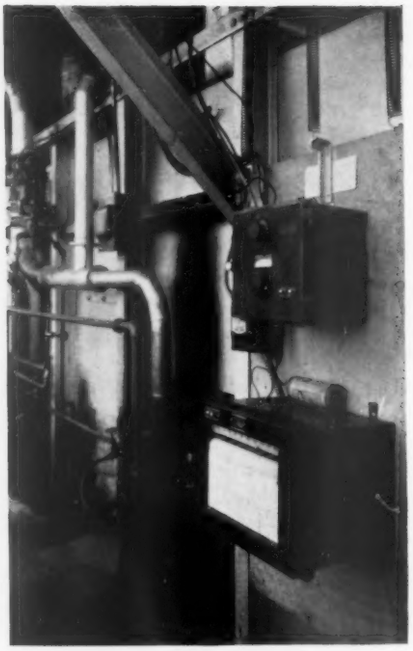
Nevertheless, judging from the growth of other industries where in-











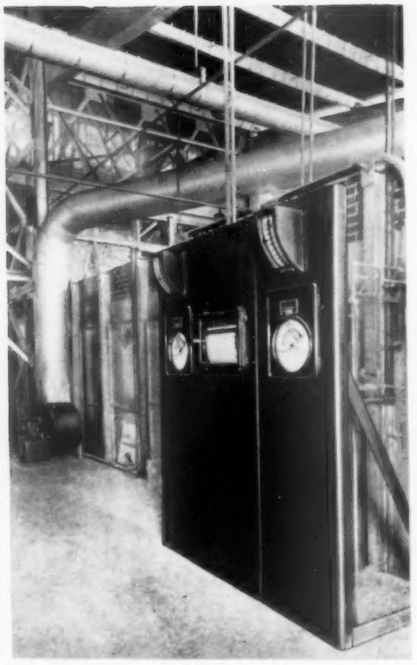


Fig. 1.—Illustrating applications of performance-measuring devices in some industries auxiliary to building the automobile. Left, reading down: textiles, The Hays Corp.; annealing sheet steel, Brown Instrument Co.; rubber, C. J. Tagliabue Mfg. Co.; chromium plating, C. J. Tagliabue Mfg. Co. Above, metering devices of the Tagliabue company and the Bailey Meter Co.

struments have proved practical and of value in securing information essential to their commercial success, it seems that a nonmetallic-minerals producer handicaps his own opportunities, not only for product improvement, but in lost opportunities for lowered production costs and increased profits, if he fails to take advantage of instrumentation that would aid in determining his exact problems and in solving them.

Similarly, instrument makers should continuously survey the minerals industries to learn the problems of individual producers. Both should colloborate in developing instruments exactly applicable to mineral-production situations since, just as the raw materials of these industries differ in their characteristics, so do the best procedures in processing them vary. It seems it should be a major objective of all instrument makers to develop instruments that will prove their value in mineral-production through these industries' satisfactory experiences with them.

The major aim of the present series of articles is to emphasize the usefulness of instruments in the nonmetallic-mineral industries through specific information relative to some practical applications.

It is well recognized, as has been intimated, that in an industry so broad and varied in its operations as this, the question of control is in many cases an individual problem which can only be worked out through a detailed and thorough understanding and correlation of conditions peculiar to each process.

There is no intent that these articles should constitute a detailed study of procedures in process control or the principles of instrument construction. However, some consideration will be given to the mechanism of the instruments themselves, though it will be limited to general explanations of working principles involved and of the construction of some types of some measuring devices.

Descriptions and discussions of actual applications will be given, with interpretations of actual charts and records produced by instruments in cement, lime and gypsum plants. Where a desirable actual application could not be secured, supplemental records and information from kindred industries will be included.

Temperature and the duration of exposure to heat play a very important *rôle* in a large number of mineral-producing processes. Intended as an aid to indicate why accurate control is necessary and particularly to emphasize the importance of temperature and time control, a brief discussion of some thermo-chemical equilibrium conditions will be included.

Though it may be said that instruments are the "language" of industrial-process control, it is realized that they are not miracle workers capable of bringing about, through their own effort, a perfect product or a perfect operation. However, it is believed that a description of some devices and a discussion of actual applications in which, through true measurement, they are providing facts rather than opinions should be of interest to producers who are not satisfied with their present progress and are desirious of discovering solutions to their own problems.

Measurement is simply comparison; usually it is a comparison of something of unknown magnitude with something of known magnitude. Industrially the major purpose of measurement is to determine ether quantity, quality or condition. Numerous essential measurements are made by especially designed and ingenious devices which, in a general way, are termed instruments. There is a great variety of instruments but all serve one purpose, and that is measurement.

Sometimes measurement or comparison is made directly. More frequently it is made by converting a quantity of one form of energy that can not be measured directly into an equivalent amount of another form that can be measured directly and represented in terms meaningful to an operator.

For many kinds of measurement instruments that merely indicate a value at the time the measurement is made suffice. In most applications, however, recording instruments are of greater utility. Recording instruments make and preserve a record of the measurement of an event, or a condition at the exact time it occurs, or they may measure and record the time interval between two or more successive events.

In all cases a visible record that may be retained for any future purpose is produced. Through careful study of such recorded facts many characteristics of an operation can be visualized as though seen in actual occurrence. A recorded chart in this way assists operators in achieving a clearer understanding of process reactions, in other words, the "why" and "how" of a procedure which may previously have been carried out only as empirical routine.

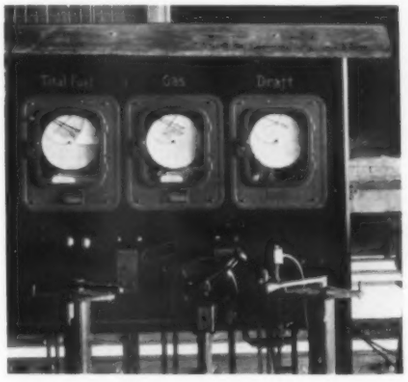


Fig. 3—Control-measuring devices that help to maintain satisfactory performance of an open-hearth furnace.

It seems justifiable, then, that each unit operation in any process should be provided with measuring equipment as complete as is necessary to provide a true story of the operation.

An example of diversely applicable instruments is indicated in Fig. 2. Here are shown a number of instruments, each suited to different temperature-measuring applications. Some the operator adjusts by hand to make measurements. Others measure automatically and signal when fluctuations occur, whereupon the operator adjusts the heat input manually. Others complete the operation by recording the fluctuation and making the adjustment as well.

Repeatedly in almost every plant operators encounter inescapable and perplexing problems which at first, perhaps, seem insurmountable. However, when a little reflective thinking is applied familiar factors appear and the feeling of frustrated helplessness disappears. Soon the problem is solved. The more exact the relative information available, coupled with the operator's own experience in similar situations, the more readily will the solution of the problem be attained. However, if the information available is not informative, but rather a mass of opinions and half-understood facts, attempts to solve such problems usually result only in

(*Continued on Page 54*)

Fig. 2—A whole family of temperature-measuring instruments differing in application.

By Z. H. MISCHKA

State-Owned Plant Among Measures Proposed as Legislators Gather

MEASURES affecting the pit and quarry industries found their way into legislative circles last month as 43 state lawmaking bodies completed their organization and settled down to sessions that will extend through the remainder of the winter and in some states well into the summer months. In no instances, however, had measures affecting the industry proceeded far beyond the introduction state up to the time PIT AND QUARRY went to press. Formalities incident to the organization of the legislative bodies, including the appointment of legislative committees, occupied state lawmakers for the greater part of the first ten days or two weeks. In a number of states, where legislatures convened during the second week of January, the introduction of bills had just started.

Mention of measures affecting sand, gravel and stone was made by governors of several states in their inaugural addresses or messages to their legislatures, indicating that bills embodying their recommendations would receive careful consideration and in most cases legislative approval.

Only one type of legislation—wage-and-hour proposals to tie in with the national Fair Labor Standards Act of 1938—had made its appearance in a sufficient number of the states to class it as general legislation affecting the industry. Advocated by the governors of several states and pushed by labor groups, the model measure drafted under the direction of the United States Department of Labor had found its way into many legislative chambers by late January. In practically all states, however, extensive hearings on the measure will be conducted by legislative committees, and until such hearings are held and committee recommendations made, any statement as to the number of states that will line up with the national administration would be nothing more than a guess.

The subject is of vital interest to the industry—both operators engaged in intrastate commerce and therefore not covered by the national act and those now covered by the national act and who, in the absence of similar regulations covering competitors for state business, may be at a distinct disadvantage in competing for purely state markets.

In many states the legislatures are being urged by business groups to withhold action on state acts pending an experience record in enforcement of the national act and a test of its constitutionality. The passage of state acts before a constitutional test of the national act, legislators have been told, would place operators in such states at an unfair advantage with operators in neighboring states without such legislation in the event the national measure fails in a court test. A detailed presentation of the status of wage-hour and other legislation occupying the attention of the nonmetallic-mineral industries in the different states appears at the end of this article.

Another general type of legislation, also mentioned by the chief executives of several states and advocated by labor groups, is labor-relations measures patterned after the national Wagner act. Only New York, Wisconsin, Massachusetts, Pennsylvania and Utah now have labor-relations measures, and in the first two states repeal or modification proposals are before the legislatures.

In "little Wagner acts" receiving legislative attention this year efforts will be made to write provisions for separate agencies for prosecution and adjudication, for granting the employer equal rights of appeal with labor union, and a declaration that coercion, intimidation, violence or repudiation of a contract by either side is an "unfair labor practice."

For 36 of the 43 states legislative sessions that started last month are the first regular meetings of the state lawmakers in two years, while in one state —Alabama—it is the first regular session in four years. Six states—Arizona, Massachusetts, New Jersey, New York, Rhode Island and South Carolina—meet every January.

The Florida legislature will convene in April. Legislatures that will not hold regular meetings this year are those in Kentucky, Louisiana, Mississippi and Virginia.

Some states place a limit on the length of their legislative sessions, often 60 days, while in others the business of lawmaking may drag on well into the summer months.

Heading the list of proposals to place state governments in competition with the industry was the bill of Oklahoma's Senator Mauk, of Caddo County, to appropriate $500,000 of highway funds for creation of a state-owned cement and asphalt plant. The plant would be administered by a superintendent responsible to a board consisting of the governor, the state highway engineer, and the state board of affairs. The location of the plant would be in Murray County, "in the immediate vicinity of large quantities of asphalt and limestone rock for the manufacture of cement and asphalt."

The plant would not only remove private companies as suppliers of cement and asphalt to the state highway department and state institutions, but the state cement and asphalt plant board would be required to "furnish any farmer and farmers' association, at the request and order of the board of county commissioners and county agent of any county, for the purpose of building baffles, dams and other necessary and proper projects for water and soil conservation and to the board of county commissioners of any county for county purposes."

The products of the plant shall be furnished at the "actual costs of production of the cement and asphalt plus 10 per cent." The cost of production would be determined by taking into consideration, among other things, the overhead expenses, including the salaries of employees, which shall be not less than the prevailing wages in the vicinity of the plant.

An emergency clause provides that the act shall be effective immediately after its passage and approval, this being "necessary for the preservation of the public peace, health and safety." Hearings on the bill had not been scheduled up to the time PIT AND QUARRY went to press.

Following is a state-by-state summary, treating of executive recommendations, bills prepared for introduction and measures introduced up to the date of this writing:

Arkansas—Governor Carl E. Bailey, in his address to the legislature, declared that "legislation distinguishing between royalty on sand and gravel taken by the state directly and that taken by holders of state contracts operating for profit should be adopted." No bill embodying this recommendation, or enlarging upon it, had been introduced by late January.

The Little Rock Council of Social

Agencies, meeting January 9, urged the establishment of an industrial-hygiene division in some state department to assist industries in reducing industrial health hazards.

Calfornia—A wage-hour act similar to the federal act has been offered by Assemblyman Samuel Yorty, with minimum wage standards above the federal requirements. The proposed scale calls for 35 c. an hr. for the first year, 40 c. an hr. for the next 6 years, and 45 c. an hr. after 7 years. The hour requirements conform with those of the national act, 8 hr. a day and 44 hr. a week during the first year, 8 hr. and 42 hr. the second year, and 8 hr. and 40 hr. the third year.

Other labor proposals, none of which had proceeded beyond the introduction stage, would limit the use of court injunctions against strikers; prohibit the enactment of anti-picketing injunctions against strikers by cities or counties; provide for the suspension of licenses of private detectives who foster labor disputes; prohibit employers' blacklists and penalize employers who made derogatory remarks about workers formerly in their employ; and would require an employer soliciting labor under strike conditions to infom prospective employees that such a situation existed.

A severance tax bill authored by Assemblyman Ernest O. Voight would tax raw material for Portland cement 15 c. a bbl.

The quarrying industry is joining with other business groups in opposition to the administration's announced intention of encouraging the organization of coöperatives.

Lieutenant Governor Ellis E. Patterson, in his inaugural address, suggested "that we begin in California to see that those who have seasonal occupations are provided with some kind of employment during off-seasons. Self-help coöperatives, factories and diversified industries can be established in those areas where we have seasonal occupations. Certainly we will never solve our migratory labor problems in California by simple urging or forcing pepole to move on when the season is over."

Colorado—The names of 11 Democratic representatives were attached to a wage-hour proposal introduced in the lower house January 12. The administration of the act would be under the state industrial commission.

Florida—The Florida State Federation of Labor, according to President Wendell C. Heaton, will sponsor a legislative program at the session which opens April 4 to include "modern labor laws for the protection of Florida workers on a par with those of other states." The program embraces the creation of a labor department, an anti-injunction law, a wage-collection law, a new child-labor law, amendments to the workmen's compensation and unemployment compensation laws, and a state Walsh-Healey act.

Idaho—The creation of a state planning board to serve as an advisory unit to the state highway department and bureau of public works, and to replace the present phosphate commission and several other boards, has been announced by Governor C. A. Bottolfsen. Revealing that he had planned to ask legislation embodying his ideas, the governor said: "I have been advised, however, that the law creating the planning board will answer my purpose. The board as it now exists has a connection with the national-resources committee and other organizations."

Indiana—A resolution has been introduced in the senate seeking to learn how more than $5,000,000 appropriated by the legislature last July for a state institution-building program is being spent. It follows complaint that state limestone and other building products are being passed over in favor of the products of other states. An effort to specify Indiana limestone when the legislation was passed last summer failed when it was asserted that such a specification might invalidate the law in so far as obtaining federal money was concerned. The resolution demands that state institution heads furnish a list of the materials used and their quantities and the names of the basic manufacturers.

A wage-hour bill has been introduced in the house over the signatures of 17 representatives. Business groups are urging that approval be withheld pending a court test of the national act. A compromise measure, which sidesteps the maximum hour provision, has been presented.

Kansas—Senators Joseph S. McDonald and Kirke W. Dale introduced a bill to regulate contracts entered into by the state, counties, cities, townships, school districts, drainage districts and any and all other political divisions of the state by giving preference to Kansas materials, supplies, commodities, labor, skilled mechanics and craftsmen.

Governor Payne Ratner, addressing the legislature, recommended the creation of a labor department "empowered to fairly enforce our labor laws in the common interests of the employees, employers and the public" to replace the present department of labor and industry.

"I recommend that this legislature enact laws recognizing the principle of collective bargaining, permitting employees to choose their own representatives without interference; that it establish a valid and enforcible prevailing-wage law," the governor added. "I recommend the adoption of measures preventing abuses in the granting of injunctions in labor disputes, establishing adequate inspection in our industrial and mining operations, and amending our workmen's compensation laws to meet changing conditions. All labor legislation should, of course, be fair to the three parties in interest—the public, the employee and the employer."

Maine—A recess committee named by the last legislature has recommended the passage of a measure creating a state labor-relations commission to determine collective-bargaining agencies but not to attempt the settlement of labor disputes.

Massachusetts—Governor Saltonstall, addressing his legislature, declared the citizen wants a job but not "industrial slavery." He added: "I recommend that you give consideration to a compulsory minimum-wage and maximum-hour law that will be of real assistance to the working man and woman of this state. We do not want to make this minimum so high as to discourage our industry, but we do want to make it sufficiently high to allow our citizens as much security as it is possible to give and still allow our industries to compete with those of other states."

Minnesota—Governor Harold E. Stassen is consulting labor, agriculture, the bar and the public in an effort to arrive at a basis for a state labor-relations act.

New York—The state C. I. O. council is seeking a wage-hour law providing for minimum pay of 40 c. an hr. and a maximum work week of 40 hr.

North Carolina—The State Farm Bureau Federation is pushing a legislative program that includes a provision for use of North Carolina limestone in all-weather, farm-to-market roads.

North Dakota—State labor groups are united on a legislative program, with measures on some of the points already introduced, to include: a wage-collection law; labor-relations act; mediation and conciliation law; contractors' licensing law; the appointment of a state boiler inspector; extension of the present unemployment-compensation provisions to one or more employees instead of 8 or more as provided by the present law; the appointment of a state safety inspector; a safety and health code; and a state wage-and-hour law.

Oregon—Definite opposition to labor groups in their effort to gain enactment of a "little Wagner act" has been raised by the Associated Farmers of Oregon, Inc.

Rhode Island—Governor Vanderbilt, addressing the legislature, declared the problem of industrial development to

be "related in a large measure to labor laws that promote harmony between the employer and the employee."

He suggested the creation of a "commission upon which shall be represented labor, industry and government. It will be the task of these men, starting out with a mutual respect for each other and believing that a better understanding of the problems of labor and industry is the surest way to peace and prosperity for both, to study the labor laws of our state, and to recommend to you members of the legislature such changes as they believe will be in the best interests of all concerned."

Utah—Governor Henry H. Blood, addressing the legislature, called attention to a study of occupational diseases by representatives of employers and employees.

"I am informed that a draft is being prepared for a proposed bill to be submitted to you which will adapt the most modern thought on this subject to Utah conditions," he said. "If a measure can be prepared, on which, after intensive study, both employer and employee can reach agreement, your task will be greatly simplified. Experience teaches in general that legislation on highly controversial topics, on which those chiefly concerned have reached agreement, can be administered with the minimum dissatisfaction and friction."

Among bills introduced in the legislature were a wage-hour measure and a bill to require that persons continuing in employment during a strike, as well as those accepting such employment, register with the state industrial commission.

Wyoming—Governor Nels Smith found nothing to criticize in the state labor laws, when addressing the legislature January 12. He warned, however, that "any legislation ill-advised, hastily drawn and selfish in motive will create class hatred and will work to the detriment of both the employee and employer. The sanctity of property is not to be invaded, the inherent right to labor must never be molested. Laws should be enacted which, in their operation, will benefit all the people; if they are otherwise, the result can only be to pull the people down to a lower plane of life."

Measurement *(from page 51)*

more confusion, and are accompanied by shut-downs as well as greater costs for repair.

It is important, therefore, when an operation is running smoothly and properly, that accurate records of correct conditions be made in order that informative facts may be available in times when, for some reason or another, the operation becomes upset.

In the successful manufacture of steel by the open-hearth process, for example, the value of reliable instruments for this purpose is well understood. The instruments pictured in Fig. 3 illustrate a type of installation depended upon for maintaining the correct rate of fuel flow and air flow, their ratio to each other, and the total quantity of fuel utilized to maintain flame temperature as high as is consistent with the life of the refractory furnace lining and the quality of steel required. Kindred operations in the lime, cement and gypsum industries do not possess measuring devices to provide such meaningful information as guidance. They depend, instead, primarily upon the ability of the kiln burner to govern the operation by visual control.

The writer has enjoyed several years' companionship with a number of the "old-time" operators and feels that their teaching and guidance, while working with them in everyday practice, form an essential part of his own technical training. From these contacts it is believed that most producers realize that their operators know the art in their specific industries. They are aware that instrument control can assist but not supplant intelligent human handling of their operations. However, occasionally plant operators tend to acquire an antagonistic attitude toward the use of control instruments. Particularly is this the case when their use seems to infringe upon the operator's own application of the art. Such a feeling quickly disappears when the operators learn that instruments can not replace them in their work. In fact, these men usually encourage the use of instruments, when they learn that the information revealed through performance-measuring devices makes possible a better understanding of *why* they carry on operations in the manner that long experience has shown to be satisfactory. More than this, they soon find that they have increased their own knowledge of the art as well as improved their product.

These statements may create an impression that merely to install instruments capable of measuring variables, such as temperature, speed, draft, flow and the like, will solve production and other problems. This is not true, of course. Instruments can not solve problems; men solve problems. Instruments are a means by which it is possible for men to secure accurate information and facts with which to do the solving. But, unlike man, instruments measure the same way each time; they make no mistake in showing differences as they actually occur.

First Cement-Soil Road Completed in Kentucky

The first soil-cement road to be built in Kentucky was completed last year. This road, 6.56 miles in length, is located southeast of Owensboro on State Route No. 54, between the towns of Philpot and Whitesville.

Early in the spring, prior to the advertising of the job, the Testing Division of the State Highway Department inspected and sampled the existing roadway. Laboratory tests showed conclusively that the soil in the road could be satisfactorily hardened with 8 to 10 per cent. cement by volume. The project was awarded to the Porter-DeWitt Construction Co. of Kirkwood, Mo.

After the first section of road, 1,000 ft. in length, was built a rainstorm started that stopped construction for eleven days. Four times during this period the waters of Panther Creek flowed over the new work. On two occasions the crest of these floods was within one foot of the 1937 high-water mark. The only damage was some washed-out shoulders; the compacted and finished soil-cement was unharmed, even though in one instance it was less than a week old when first submerged.

When construction was completed, it was found that the average rate of production had been 1,573 ft. of completed roadway per 12½ hr. working day. On two occasions the crew built 2,000 ft. of completed road in 12½ hr.

The Porter-DeWitt Construction Co. used what is known as the "Mix-in-Place" procedure on this job.

The existing road, an 18- to 20-ft. gravel road, 3 in. in depth with a subgrade that varied from a silt to a sandy clay loam, was converted into a 6 in. roadway 20 ft. wide, properly mixed and compacted to maximum density from subgrade to surface.

Each completed day's work was immediately covered with four pounds of straw per square yard and the straw kept moist for seven days to prevent evaporation and make certain that a constant volume was maintained until the roadway hardened.

This type of low cost light traffic road, though new to Kentucky, is being used extensively throughout the country. At the present time 26 states have constructed or awarded for construction a total of about 200 miles of soil-cement roads.

The Kentucky project was constructed under the direct supervision of the Kentucky State Highway Department, T. H. Cutler, state highway engineer; George H. Hailey, district highway engineer; Lamar Riney, resident highway engineer.—*(Kosmos News.)*

Personal Mention

LOWELL R. BURCH, New York industrialist, has acquired a substantial interest in the Glens Falls Portland Cement Co. through the purchase of the shares formerly held by the George F. Bayle interests and those held by two Glens Falls, N. Y., banks. He has been a director of the company for nearly a year.

DANIEL D. THOMSON, president of the Kentucky Rock Asphalt Co., Louisville, Ky., since February, 1934 has resigned to enter business for himself. He has been succeeded by GEORGE H. BECHILL of Indianapolis, Ind., formerly vice-president of the Middle West Roads Co., a subsidiary of Warren Bros. Roads Co. of Boston, Mass.

J. F. MITCHELL-ROBERTS, export manager for Oliver United Filters, Inc., has just returned from a 2-yr. business trip which took him around the world.

JAMES H. ACKERMAN has been made vice-president in charge of sales by the Lawrence Portland Cement Co., New York, N. Y.

J. D. FACKENTHAL, prominent New York attorney, has been made a director, executive vice-president and counsel for the New York Trap Rock Corp., New York, N. Y.

GEORGE D. KARSCH, head of the California Vermiculite Co., has opened a plant in Sacramento, Cal., where material used for the insulation of homes and buildings will be manufactured. It is said to be the only factory of its kind in California north of Los Angeles.

HENRY S. MOSSER of Williamsport, Pa., has been elected a director of the Lehigh Portland Cement Co. to succeed his brother, the late GEORGE K. MOSSER who died Nov. 22.

ROLLO FRAME of Columbus, O., has purchased the Quinn & McCann concrete burial-vault plant at Kenton, O., and will continue to operate it.

NEIL C. HURLEY, JR., has been elected a vice-president of the Independent Pneumatic Tool Co. He has been secretary of the company for the past four years.

HARVEY A. TUTEWILER, 49, president of the Ready Mixed Concrete Corp. of Indianapolis, Ind., met his death recently in an automobile accident near Kirklin, Ind. He organized the concrete concern seven years ago and before that time had been connected with the Standard Paving Co. for more than 20 years.

D. FRANK BAIM, 62, Easton, Pa., office manager and purchasing agent for the Vulcanite Portland Cement Co., Alpha, N. J., died January 2 after an illness of six weeks.

THOMAS E. SANTEE, New England district manager for the Alpha Portland Cement Co., died December 26 in a hospital at Milton, Mass. He had been connected with the cement company for more than 30 years.

RUSSELL CLEMMER, 34, head of the Bachman Terrace Sand Co., Allentown, Pa., met his death recently when he fell into a set of crushing rolls at his plant.

FRED CRITCHETT, 62, engaged in the sand-and-gravel business at East Detroit, Mich., for the last 20 years, died a short time ago after a year's illness.

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ALTON HUTCHINS, 57, chief chemist for the Wolverine Portland Cement plant in Coldwater, Mich., died recently of a heart attack.

NEWELL R. COX, 50, mine foreman at the Three Forks Portland Cement Co. plant at Hanover, Mont., was instantly killed on Jan. 5 when crushed under a rock slide.

ARTHUR H. TAYLOR, 58, president of the White Hill Sand & Gravel Co., Salt Lake City, Utah, died recently following a leg injury. He had long been prominent in the affairs of the Mormon Church.

MICHAEL RIESNER, consulting engineer for Worthington Pump and Machinery Corporation, and an outstanding authority in the field of air and gas compression, died suddenly at his home in Buffalo, N. Y. on December 12.

W. R. SEIGLE, 59, chairman of the board of directors, vice-president and director of research of the Johns-Manville Corp., died December 26 in Rochester, Minn., after having undergone an operation.

• Geologic Names

Definitions of the more than 10,000 named stratigraphic units in the United States and Alaska, which are scattered throughout the geologic literature of the past hundred years, have been summarized and brought together in one publication entitled "Lexicon of Geologic Names in the United States," published recently as Bulletin 896 of the Geological Survey, United States Department of the Interior. The definitions were assembled during a period of about 25 years by Miss M. Grace Wilmarth, the compiler of the lexicon, in her capacity of Secretary of the Survey's Committee on Geologic Names.

The lexicon, which is issued in two volumes and contains 2,396 pages, gives the names of stratigraphic units in North America published up to the beginning of 1936. Definitions and redefinitions where necessary are given for units in the United States and Alaska. The names and current age designations of the geologic units of Canada, Mexico, Hawaii, the West Indies, and Central America are also listed, together with citations to the publications in which they were first defined. The principal subsurface units in the United States have been listed, but names of coal beds and ore beds are not included. The arrangement is alphabetical; part 1 contains names beginning with letters A to L; part 2, those from M to Z. The lexicon is available only from the Superintendent of Documents, Government Printing Office, Washington, D. C., at $2.50 for the set.

All names that have appeared in geologic literature are included, regardless of whether they form a part of the official classification of the Federal Survey.

Sprout, Waldron & Co., Muncy, Pa., announces the opening of a New York office to be located at 50 Church St. David E. Smyth, district manager, will be in charge.

Traffic News Digest

LEGISLATION

Roosevelt Committee Report.—The committee appointed by President Roosevelt to study the railroad problem and report to him, has filed the report which has been approved unanimously by the committee. The report of the committee, which will no doubt be the basis of the administration's railroad legislative program, is summarized as follows:

Rapid and largely unregulated development of transportation facilities in the United States has produced a national transportation problem without a national transportation policy. One result of the absence of a clearly-defined policy is an intensified but unequal and economically wasteful competition for traffic among the several modes of transportation; unequal by reason of governmental favoritism of some of the modes of transportation over others, economically wasteful because it has resulted in the creation of transportation facilities beyond the ability of the traffic of the country to support.

The major factor in the present distressed condition of the railroads is the low volume of their traffic. A contributing factor is the depressed character of many of their rates. Competitive modes of transportation are partially responsible for the former and almost wholly responsible for the latter. To the extent that the inroads made upon railroad traffic and revenues by other modes of transportation are not due to natural advantages which the latter possess, but are attributable to artificial advantages accruing to their competitors as a result of governmental favoritism in any respect, the railroads have a right to object. Such favoritism now exists in pronounced degree in the important matters of regulation, taxation and subsidies.

While substantial relief should come with improvement in general business conditions, the removal of these important contributing causes is essential to the healthful functioning of the transportation industry. Certain temporary measures are necessary and should be adopted, but the only way in which anything of lasting benefit may be accomplished is by equalizing the situation of all modes of transportation with respect to the three important matters mentioned. The first step is the adoption of a national transportation policy based upon such principle of equalization as will provide a fair field for all and special favors for none of the various modes of transportation. The next step is the creation of the necessary machinery to secure the effective execution of the declared policy. The recommendations submitted are largely directed to these two ends. These recommendations include:

National Transportation Policy.—Adoption by the government of a definite national transportation policy providing for fair, impartial regulation of all modes of transportation, so administered as to preserve the inherent advantages of each.

Jurisdiction of Interstate Commerce Commission.—Responsibility to be placed in the interstate commerce commission to administer all regulatory provisions with respect to rates, services, valuation, and accounting as to all modes of transportation, together with powers of investigation limited to its jurisdiction.

Revision of Rate-Making Rule.—Repeal of the present provisions of Section 15-A of the interstate commerce act and substitute therefore a new rate-making rule applicable to all modes of transportation, with suggested wording of the rule.

Long-and-Short-Haul Clause.—Repeal of the so-called long-and-short-haul clause of section 4 of the act.

Reparation.—Amendment of Sections 8 and 16 of the act relating to reparation in accordance with recommendations heretofore made by the interstate commerce commission.

Intrastate Rates.—Extension of the power of the commission with respect to intrastate rates in connection with general readjustments of interstate rates.

Transportation Board.—A new and independent agency to be created, charged with the duty of investigating and reporting to the Congress concerning the relative economy and fitness of several modes of transportation and to the extent to which any of them is now being subsidized, with its recommendations for further legislation. Thereafter to be charged with responsibility for administering as to all modes of transportation regulatory provisions relative to certificates of convenience and necessity covering new construction or operations and abandonments of facilities or operations, and the approval of the issuance of securities, consolidations, mergers, leases, acquisitions of control, interlocking directorates, etc., and to exercise all functions of a research or promotional nature relating primarily to any mode of transportation now vested in other agencies or bureaus.

Tolls for Use of Improved Waterways.—A fair and reasonable system of tolls for commercial use of certain inland waters, the elimination of the inland waterways corporation and disposal of its properties.

Taxation and Other Governmental Impositions.—Legislation, national and state, relieving the railroads of certain unjust tax burdens and providing that government bear the expense of eliminating grade crossings.

Reconstruction of Bridges and Other Facilities.—Adoption of policy that whenever, in connection with the improvement of navigable waters or the carrying out of flood-control or similar projects, a railroad is required to alter or reconstruct bridges or other facilities, it be reimbursed by the government for all costs in excess of any direct benefit accruing to it.

Land-Grant Rates.—Repeal of the reduced rate provisions of the land-grant statutes.

Reorganization Court.—The establishment of a single court vested with exclusive jurisdiction over matters connected with railroad reorganizations.

Consolidation Plan.—Repeal of the provisions of the act which make the Commission responsible for the prescription of a general plan of consolidation for railroads.

R.F.C. Loans.—Giving the Reconstruction Finance Corporation more power in making loans to railroads without approval of the interstate commerce commission.

I.C.C. Report.—The Interstate Commerce Commission in its annual report to Congress recommends legislation that would bring non-carrier railroad subsidiaries within its jurisdiction as far as accounting and issuance of securities is concerned. It also recommends amendment of section 15 to permit it to establish minimum rail-water rates, and to permit it to establish through rates in the public interest. The right to impose a fee for admission to practice is also requested.

RECENT I.C.C. DECISIONS

Lime.—Permanent fourth section relief has been granted in connection with the rates on lime from trunk line to central territory in

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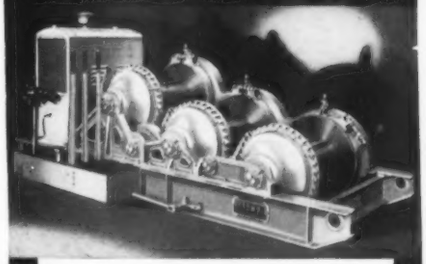

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response to applications filed by interested carriers. Rates are to be made by use of the mileage scales prescribed by the Commission. I. C. C. F. S. C. No. 13,110.

Limestone.—The Commission has found justified the proposed reduced rates on limestone from Sugar Factory, Utah, to destinations in Idaho, subject to the filing of a proper intermediate clause to avoid violation of section 4. The rates were made to meet the competition of Moor, Nev., and Willow Creek, Ida., producers and were suspended on protest of the Utah Idaho Central and the city of Providence, Utah, on the assumption that if the proposed rates became effective a limestone tipple at Providence would be moved to Sugar Factory. I. C. C. Docket I. & S. No. 4,514, Lime rock, Sugar Factory, Utah, to Idaho.

Sand.—The Commission has found that the refusal of the Kansas commission to grant the 15 percent. increase in rates on Kansas intrastate traffic in sand, gravel and related articles and other commodities has resulted in violation of Section 13. While the Commission has not issued an order in the case it has given the Kansas commission 30 days in which to reconsider its refusal to permit the increases. I. C. C. Docket No. 28,070, Increases in Kansas Freight Rates and Charges.

The Commission has awarded reparation and waived an undercharge on finding that the rate charged on moulding Humaston (Blossvale), N. Y., to Hill Grove, R. I., was unreasonable to the extent it exceeded $2.90 a net ton. I. C. C. Docket No. 28,025, Rhode Island Malleable Iron Works v. N. Y. C. et al.

EXAMINER'S REPORT

Crushed Stone.—Examiner Claude A. Rice recommends that the Commission find the rates on crushed stone from Akron, Bowmansville, Cheektowaga, Le Roy, North Le Roy and Stafford, N. Y., to destinations in New York, Ohio and Pennsylvania, unduly prejudicial and preferential and revise the order in 226 I. C. C. 309 entered in February, 1938. He suggested that the undue preference and prejudice might be removed by establishing rates from the above named points that were no higher, mile for mile, than the joint-service rates contemporaneously maintained on crushed stone from Cheektowaga, N. Y. to the same destinations, distances to be computed over the shortest routes composed of not more than three line-haul carriers, over which carload traffic could be moved without transfer of lading. I. C. C. Docket No. 28,080, General Crushed Stone Co., *v.* A. & A. *et al.*, and related cases.

NEW COMPLAINTS FILED

Cement.—The Commission has suspended certain schedules in supplement No. 54 to P. R. R. Tariff I. C. C. No. 1,622, and supplement No. 87 to Western Maryland Tariff I. C. C. No. 8,182 which propose to cancel the application of the intermediate rule in connection with the rates on cement, in carloads, from points in Maryland to destinations in trunk line and New England territories, which would result in increased rates. I. C. C. Docket I. & S. No. 4,561.

Sand.—Reparation is requested on an allegation that the rate of $4.20 a net ton charged on sand from Saratoga Springs, N. Y., to Mechanics Falls, Me., was unreasonable to the extent it exceeded $3.10; in a complaint filed by Leo Tessler, 1,148 Manor Ave., New York, N. Y., in I. C. C. Docket No. 28,156, J. W. Penny & Sons Co., Mechanics Falls, Me., *v.* B. & M. *et al.*

Reparation is prayed for on an allegation of unreasonable rates and charges on sand from Polk, Pa., to Erie, Pa., in a complaint filed by Brooks, Curtze & Silin, 1013 Erie Trust Bldg., Erie, Pa., in I. C. C. Docket No. 28,165, National Erie Corp., Erie, Pa., *v.* N. Y. Central.

Occupational Diseases and the Law

"Accident"

Whether or not occupational diseases are included within the term "injury by accident" in the South Carolina Workmen's Compensation Act is discussed but not decided in the case of *Spearman v. F. S. Royster Guano Co.* decided by the Common Pleas Circuit Court of Spartanburg County, South Carolina, and affirmed by the South Carolina Supreme Court on October 31, 1938 (reported at 199 S. E. 530).

The South Carolina Industrial Commission in denying compensation in this case had stated that "while the word 'accident' need not be narrowly defined, it can not be embellished and broadened to such an extent as to include typically genuine 'occupational-disease' cases." The claimant, in his court appeal, urged that on the precedent of *McNeely v. Carolina Asbestos Co.*, 206 N. C. 568, 174 S. E. 509, decided under the similar law of North Carolina, the South Carolina Workmen's Compensation Act should be held to cover occupational diseases. The court on this point says:

"In this connection the claimant seeks to find support in the case of *McNeely* v. *Carolina Asbestos Co.*, 206 N. C. 568, 174 S. E. 509, decided May 23, 1934, in which the Supreme Court of North Carolina considered a common-law action brought for damages because of alleged asbestosis, from which plaintiff suffered as a result of his employment in defendant's plant. It may be argued from that case that the Supreme Court of North Carolina has held that the words 'injury by accident' as used in a compensation act do include some sort of diseases designated as occupational. However, even in the light of the construction of the North Carolina Act, Code 1931, §8081h-hhhh, as stated in the McNeely case, claimant is met with the later case of *Swink* v. *Carolina Asbestos Co.*, 210 N. C. 303, 186 S. E. 258, decided by the same court June 15, 1936. That, too, was an asbestosis case, and the facts were substantially similar as in the McNeely case. The Swink case was brought as a claim under the North Carolina Compensation Act and compensation was denied by the com-

mission with a finding of fact that the claimant had sustained no injury by accident. Upon a reversal by the circuit judge of the award of the industrial commission denying compensation, the supreme court reversed the superior court and held that the plaintiff's condition was not compensable under the act because the courts were bound by the finding of fact made by the industrial commission, such finding being supported by competent evidence."

No ruling is made on this question by the South Carolina courts, however, since the denial of compensation by the industrial commission was affirmed on the ground that the evidence showed that the condition of claimant's eye (which was the subject of the litigation) was not due to the alleged gases in the place of his employment.

Aggravation of Disease

Grain Handling Co., Inc. v. *McManigal,* decided by the United States District Court, Western District of New York, May 31, 1938; reported at 23 Fed. Supp. 748. This was a case under the Federal Longshoremen's and Harbor Workers' Compensation Act, reviewing a compensation order from "a fibrosis of the lungs and other complications caused by exposure naturally resulting from the claimant's occupation as a grain shoveler." To support the award under the statute involved there must be evidence to show that the claimant sustained an "injury" as defined in the act, and that there is a direct causal connection between the injury and the employment.

The evidence did not show that there was any inorganic material in the grain dust which could cause tuberculosis. "However, it is not necessary to find that grain dust causes tuberculosis, if claimant was suffering from dormant tuberculosis, and this condition was activated or aggravated by employment in grain dust. While tuberculosis does not inhere in the occupation of working in grain dust, nevertheless the activating or aggravating of a prior condition was an 'injury' as defined by the statute, since it can be said that the aggravating or activating of a prior condition would naturally arise in this type of employment. The law is well settled that the word 'injury' as used in the statute includes any aggravation or activation of a previous condition, provided it can be said that such aggravation arose naturally out of the employment."

The evidence is held to support the award, which is consequently affirmed.

Earl Ives Equipment Co., Mentor, O., has been appointed representative by the Ransome Concrete Machinery Co., Dunellen, N. J.

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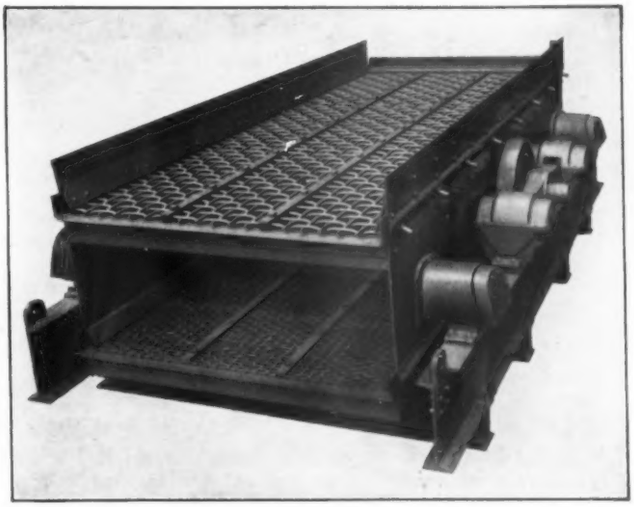

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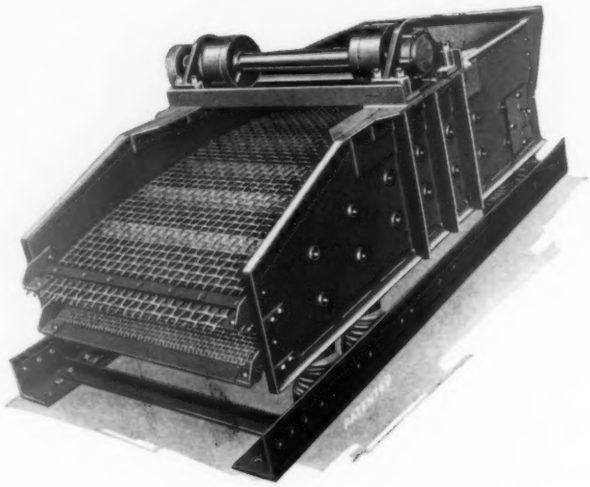

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Compression springs mounted on the clamping plate bolts maintain the proper tension on the screen cloth wires. No whipping with resultant breakage. No baggy screen panels.

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Foreign Developments

Quick-Setting and Heat-Evolving Cements

Continuing earlier studies on the general subject of quick-setting and heat-evolving cements, the author studied cements having activity indices less than 1 and lime contents lower than 30 per cent., and confirmed the conclusion that quick-setting and heat-evolving cements of good qualities may be found within this limit. The tabulated results show that free lime was not found in every cement of the tests; these high aluminous cements are very slow in setting but their hardening properties became better with a decrease in the silica content.—Kei-ichi Akiyama in *Kogyo Kwagaku Zassi, Journal of the Society of Chemical Industry, Japan,* 41:249B-250B, August, 1938.

New Method of Finding Heat Evolved in Set

The authors describe a new method developed for the determination of the heat evolved in the setting of cement. The method consists essentially in introducing the cement specimen that is to be tested, along with a control substance (glass vessel with water) insulated in the same manner, into an appropriately constructed calorimeter; the control substance is maintained at the same temperature as the cement, by means of electric heating regulated by photoëlectric control, during the entire setting process. The heat of setting can be directly calculated from the electric energy consumed, which can be measured with a registering instrument. The heat evolved in the setting of various cements, a trass cement, a mixed cement with Thura cement and a pure Portland cement, were investigated at different intervals of time.—W. Eitel, H. E. Schwiete and K. Wilmanns in *Zement* 27:554-558, Sept. 15, 1938.

Mineral Wools As Asbestos Substitute

Mineral wools—slag wool, rock wool and glass wool, of which slag wool leads in production in Germany with an annual output of about 24,000 metric tons—are of especial interest to Germany because of their importance in the construction industry as insulating materials, and, particularly, as

substitutes for asbestos, of which Germany in 1925 imported 12,000 tons of a value of 15,500,000 marks. The author traces the historical development of these materials: slag wool being reported in Wales from the year 1840, although the first record of factory production is that of George Parry, also in Wales, in 1864. Rock wool had its origin at the plant of Charles C. Hall, at Alexandria, Ind., in 1897, and still is best known and most widely used in America. Glass spinning is traced back to Venetian glass-blowers of the fifteenth to seventeen centuries, but the first true glass wool, produced in a manner similar to that of slag wool and rock wool, originated in the centrifugal process of Rosengarth and Hager (German patents 539,738 and 579,689) in 1930, and the blast process of the Owens Illinois Co. in 1934 (German patent 626,436) first reached the productive capacity available in the production of slag wool. In addition to heat insulation, the mineral wools have recently been finding application in sound insulation.—Dr. A. Guttman in *Tonindustrie-Zeitung* 62:681-683, 695-696, Aug. 8 and 11, 1938.

Effect of Aggregate on Elasticity of Concrete

Tests were made on concrete beams of different sorts and amounts of coarse aggregate, on the basis of the same water-cement ratio, and a comparative series of tests were made according to the investigations of Hummel and Graf. As in the investigations of Hummel and Graf it was determined that the elasticity of concrete can be affected to a large extent by the elasticity of the coarse aggregate, in the sense that as the elasticity of the coarse aggregate increases the elasticity of the concrete also increases. In connection with the effect the different quantities of coarse aggregate it was determined that in a given mortar composition the maximum modulus of elasticity occurred at about 2.5 to 3 parts by weight. In lean mixes the strength lay within narrow limits along with a considerably varying modulus of elasticity, while on the contrary in going over to fatter mixes a gradual shift to the opposite state of facts could be observed.

An experiment at theoretical derivation of the modulus of elasticity of concrete from the moduli of elasticity of its components showed, in the case of diabase and gabbro, a very good correspondence with the values determined experimentally.—Dipl.-Ing. Max Gosslar in *Zement* 27: 517-520, 533-536, 546-549, 596-598, Aug. 25, Sept. 1, 8 and 22, 1938.

Trade Literature

Diesel Power at a Touch of the Button. 16 p. Cleveland Tractor Co., Cleveland, O.

Worthington Power Pumps. 4 p. Worthington Pump & Machinery Corp., Harrison, N. J.

Repair Clamps and Saddles for Steel and Cast Iron Pipe. 32 p. M. B. Skinner Co., South Bend, Ind.

Truck and Trailer Size and Weight Restrictions—1939. 54 p. Four Wheel Drive Auto Co., Clintonville, Wis.

Mott Diamond Core Drills. 4 p. Mott Machine & Mfg. Co., Huntington, W. Va.

Louisville Rotary Dryers. 36 p. Louisville Drying Machinery Co., Louisville, Ky.

Eimco Jaw Crushers. 4 p. The Eimco Corp., Salt Lake City, Utah.

Speed Dumper—Safe, Efficient, Economical. 4 p. Speed Dump, Inc., New York, N. Y.

Type JTB Stationary Diesel Engine. 8 p. Cooper-Bessemer Corp., Mt. Vernon, O.

The Pipeline That Moves. 8 p. Osborn Mfg. Co., Cleveland, O.

All-Steel Belt-Conveyor Idler. 6 p. Bodinson Mfg. Co., San Francisco, Cal.

Low-Head Horizontal Screens. 12 p. Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Rex Screw Conveyors. 64 p. Chain Belt Co., Milwaukee, Wis.

Baker Rotary Scraper. 4 p. Baker Mfg. Co., Springfield, Ill.

Wire Rope for Mining and Contracting. 96 p. Broderick & Bascom Rope Co., St. Louis, Mo.

Type XVO Diesel-Driven Compressor. 16 p. Ingersoll-Rand Co., New York, N. Y.

The Buda-Hebron Earth Drill. 8 p. The Buda Co., Harvey, Ill.

The New Arc Welding Technique. 20 p. Lincoln Electric Co., Cleveland, O.

INCORPORATIONS

Michigan Asbestos Mining Co., Grand Rapids, Mich. $50,000. Incorporators: H. J. Bylan, Win Jones, Jr., Robert S. Tubbs.

West Texas Sand & Gravel Co., Big Springs, Tex. $5,000. Incorporators: Ida Dee Grafa, Clyde McMahon, and Otis Grafa.

Genesee Concrete Pipe, Inc., Holly, Mich. $10,000. Incorporator: Wm. J. Ehlers, 402 E. Atherton Rd., Flint.

Gaston Stone & Gravel Co., Gastonia, N. C. $50,000. Incorporators: H. Lindley Rutter, Glenn Pearson, and A. C. Jones.

Greenville Crushed Stone Co., Greenville, Ky. $3,000. Incorporators: B. L. Andrews, H.E. Eaves, Sr., and C. A. Lile.

Quality Sand & Gravel Co., Clarksville, Ark. $10,000. Edgar L. Matlock, Van Buren, Ark., H. T. Spratt, Ft. Smith, Ark., and others.

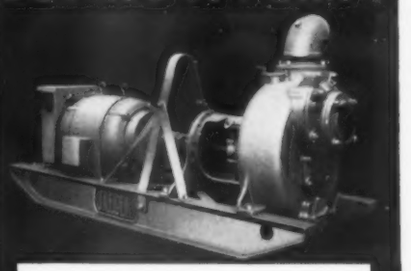
Tiber Sand Co., Inc., Cullowhee, N. C. $25,000. Incorporators: H. H. Harris and Fred L. Sale, Asheville, N. C.; and Ruby Moss, Athens, Ga.

Norwalk Sand & Gravel Corp., Norwalk, Conn. $50,000. Incorporators: Wm. J. Sculley, Daniel Deering, and Edward J. Eason.

Western Stone Products Corp., Torrington, Wyo.

Angelus Onyx Corp., Los Angeles, Cal. $25,000. Incorporators: A. S. Gould, Earl Cohen, and A. C. Acason (Santa Ana).

BUYING A PUMP?



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Combine 100% automatic priming with the huge water volume and low power requirement of high efficiency centrifugals. Meet any demand for gravel washing up to 220,000 G. P. H.

Compact, simple, noted for long-life operation. All sizes to 10", gas or electric, on wheels or base. Get catalog, prices and performance data.

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PLUS POWER
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POWDER NATIONAL COMPANY

NATIONAL "*HIGH*-X-PLOSIVES" are invariably *fresh and unimpaired* because they are made to your order and shipped direct to you—an assurance of plus-power explosives.

Write for information about:

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NATIONAL POWDER CO.
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DUKE CENTER, PA. ELDRED, PA.

The Model "135" LOADER

is the fastest loading machine within $5,000 of its price, as well as heaviest, strongest and most powerful Loader built. It competes with BIG equipment. On a cost-per-yard basis, it's all alone. ***Bulletin 134***

Write, Wire or Phone

HAISS

George Haiss Mfg. Co., Inc., 142nd & Rider Ave., New York

Who, for over 45 years, have created and sold none but equipment of demonstrable superiority in design and manufacture.

Portable Conveyors—Revolving Screens

New Machinery and Supplies

• Excavator

The Thew Shovel Co., Lorain, O., has announced the Lorain 79, excavator, a newly-designed 1½-cu. yd. unit convertible to shovel, crane, clamshell, drag-line or backdigger service.

The new machine is mounted on a chain-drive crawler with two travel speeds, 1½ and ¾ m.p.h., in either direction.

All the propelling and steering mechanism of the crawler is located in a central steel car-body casting or gear box. All the operating mechanism is protected against mud, dirt and water by an oil tight gear case. The gear case is fitted with inspection plates and hand holes which permit easy and quick inspections of the gears and clutches.

All bearings in the propelling mechanism have pressure lubrication direct to each bearing, provided thru grease leads centralized at the front of the casting. The entire mechanism in the gear box operates in an oil-bath.

The Lorain 79 is supplied with an all-welded shovel boom 23 ft. long. The two boom side members introduce a new design feature in that each is a built-up steel tube of rectangular cross-section, entirely electric welded into a unified structure.

The dipper stick is also an all-steel, all-welded construction of rectangular cross sections and is actuated through an independent chain crowd acting through a hinge-pin drive.

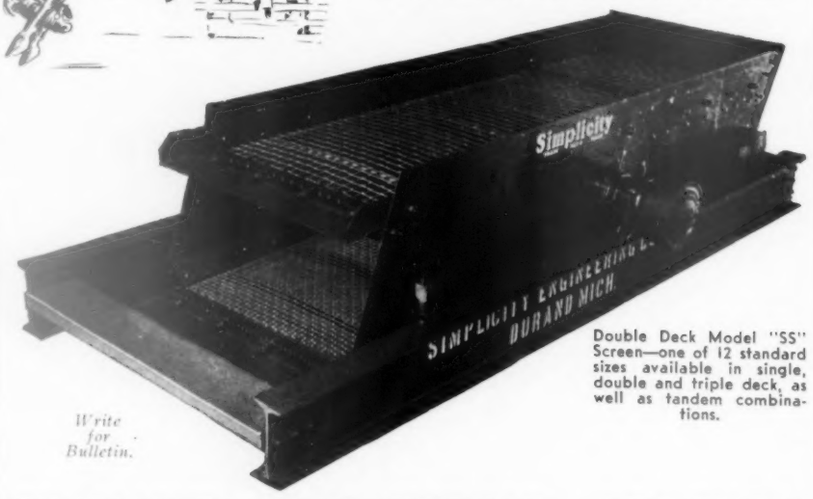
New crawler-mounted shovel.

The turntable is built to the "center-drive" design, power being taken from the 6-cyl. Diesel engine and transmitted through a silent chain drive. This consists of two pinions mounted side by side. The inner pinion meshes with the swing and crowd, or travel, shafts, powering them directly. The outside pinion meshes with the hoist shaft gear. By this mechanism, the torque going into the hoist shaft is increased, thus bringing about an even more correct balance and distribution of power and speed to all three power shafts to produce the most powerful, speedy and smooth working cycle.

Balanced Vibration

Rubber-cushioned Power

SIMPLICITY Gyrating Screens with solid counter-balanced shaft, resilient rubber mounting, completely protected bearings and four-way tension screen cloth, are giving fine performance in accurate screening and economical operation.



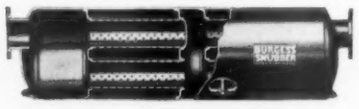
Double Deck Model "SS" Screen—one of 12 standard sizes available in single, double and triple deck, as well as tandem combinations.

Write for Bulletin.

SIMPLICITY ENGINEERING COMPANY
DURAND ∴ ∴ MICHIGAN

• Muffler

A new type of noise-quieting device which is non-acoustic and can be placed at any point in the intake or exhaust system of an engine or compressor, has recently been developed by the acoustic division of the Burgess Battery Co., Chicago, Ill. Since it eliminates the cause of noise produced by the pulsating gases by snubbing the peak velocities and pressures and thereby produces a smooth flow of gas, this new device is called the Burgess Snubber.



New type of exhaust muffler.

The effect of the snubber is to prevent the sudden impact of the slug of vented gas with the atmosphere and also to stop the usual in-rush of air into the exhaust pipe, after the discharge of the slug. Therefore, the sharp noise of the slug impact and the rumbling noise of the vibrating air column in the exhaust pipe are eliminated. Roughly speaking, its effect on the exhausted gases is much like that of braking an automobile to a gradual stop and thereby avoiding the noise of a crash with a stationary object by avoiding the crash itself.

The same type of unit is applicable to intake and output lines of reciprocating and rotary compressors. Burgess Snubbers are available in a wide range of sizes for standard, heavy duty, and spark arresting service.

Portable plant producing stone chips as by-prdouct.

• Stone Chips

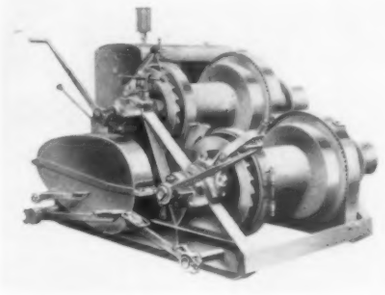
With the increased mileage of black-top roads there is an increasing demand for stone chips for the seal coat. These chips are expensive to purchase and expensive to produce.

To meet this new demand, the Pioneer Engineering Works has designed a screening arrangement for its Vibrator duplex crushing plant that will produce stone chips as a by-product simultaneously while producing gravel. This means that the Pioneer user can produce chips for the seal coat at the same time that he is producing base-course material. There is no waste material as the crusher dust is screened out of the chips and mixed with the road gravel. There is no additional expense as no extra screens or equipment are required. The crushers are not set any closer so that total production is not curtailed.

The Pioneer vibrator duplex crushing plants use the bottom deck. Thus, the bottom deck screens the pit-run material only and the top deck screens the crushed material only. In this screening arrangement, the pit material and the crushed material are not mixed together. Therefore, it is possible to screen out 100 per cent. crusher chips on the top deck. Chip spouts are provided to deliver the chips onto a belt conveyor.

• Hoist

A new, all-purpose gasoline hoist that has three speeds instantly available on both drums has been introduced by Clyde Iron Works, Inc., Duluth, Minn. The variation of speeds and loads is obtained through a clutch and gear shift as simple and easy to operate as an automobile.



The three-speed hoist.

Virtually, this is a "3-in-1" hoist. For heavy work there is available, a 7500-lb. single-line pull at 200 f.p.m.; for medium work, 4200 lb. on a single line at 350 f.p.m.; for high-speed work, 2500 lb. on a single line at 600 f.p.m.

Power is obtained through an 85-h.p. V-8 industrial-type gasoline engine. The complete unit is built on a skid-type, one piece, all steel frame, including bearings and stands.

Its outstanding feature is that it is geared to the loads to be handled—the loads do not have to be adjusted to fit the hoist.

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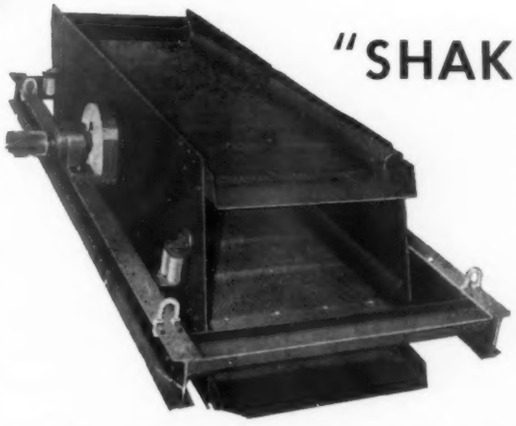
AIR SEPARATORS

are the modern means of producing extremely fine products and increasing Mill capacities. Tell us of your problem.

STURTEVANT MILL CO.
Harrison Square, BOSTON, MASS.



"SHAKEDOWN!"

In all sifting operations, you can get the best "shakedown" with New Holland Screens. There's no stopping the *new circle-throw* vibrating action, which cuts cost of producing aggregates, increases tonnage and gives uniformity in grading material. New Holland Screens, for Standard or heavy duty, are built in full range of sizes, with one, two or three decks. Constructed to assure a long service life at a low maintenance cost.

"CRUSH IT UP!"

The New Holland Roll Crusher is a real "manhandler" of tough rock. Just dotes on those hard crushing jobs which trouble ordinary crushers. New type patented pulsating feeder doubles capacity. Rib shell construction increases angle of grip and reduces dust. Standard sizes, capacities up to 100 tons per hour.

Write for Bulletins

NEW HOLLAND MACHINE CO., New Holland, Pa.

● Diesel Engine

The Murphy Diesel Co., Ltd., of Milwaukee, Wis., has announced a new 200-h.p. Diesel engine known as the ME-650. The design of this engine conforms to that of the standard Murphy Diesel Model ME which has proved so successful in service. Injection is direct into a plain symmetrical combustion chamber. Injector and fuel pump are combined in one unit which is easily and quickly removed and replaced. There are no high pressure fuel lines and injectors cannot become air bound.

Special care has been taken to assure cool operation and pistons are oil cooled under pressure. This eliminates ring troubles and any need for special lubricating oils.

Four valves are provided for each cylinder, assuring maximum breathing capacity and rapid scavenging. Should the oil pressure drop below a fixed minimum pressure, the engine automatically shuts itself off. Control is through a single lever which permits easy and simple toggling-in for remote control.

Starting is accomplished by a standard 24-volt starter. The ME-650 can be had either as a bare engine or with radiator and full enclosure. Skids, outboard bearings, and direct connected generator units are also available.

SIZE OF OPENING	AIR		STEAM		WATER	
	Number of Cu. Ft. Wasted per Month 100 Lbs. Pressure	Total Cost of Waste per Month @ 10c per M Cu. Ft.	Number of Lbs. Wasted per Month 100 Lbs. Pressure	Total Cost of Waste per Month @ 60c per M Lbs.	Number of Gallons Wasted per Month 40 Lbs. Pressure	Total Cost of Waste per Month @ 15½c per M Gals.
1/2"	17,798,400	$1,779.84	805,000	$483.00	1,231,000	$192.00
3/8"	9,979,200	997.92	460,000	276.00	692,400	108.00
1/4"	4,449,600	444.96	203,000	121.80	307,700	48.00
1/8"	1,114,560	111.46	50,500	30.30	76,900	12.00
1/16"	278,640	27.86	12,750	7.65	19,200	3.00
1/32"	69,552	6.96	3,175	1.91	4,800	0.80

Leaks, even small ones, in pipe-lines are expensive as the above chart from a new catalog brought out by the M. B. Skinner Co., South Bend, Ind., will indicate. The concern specializes in repair clamps for stopping leaks without replacing pipes.

BACON FARREL CRUSHERS

Complete Plants Designed and Equipped. Screens, Elevators, Conveyors, Quarry, Sand and Gravel Plant Equipment. Engineering Service.

EARLE C. BACON, Inc.
17 John Street New York, N. Y.

● Excavator

One of the most popular excavators built by the Marion Steam Shovel Co., Marion, O., is the Type 331 machine of ¾ cu.yd. capacity. With its several new and desirable improvements it is bound to even surpass its present reputation of top speed and performance.

Twelve desirable features incorporated into the construction of the Marion Type 331 provide it with all of the stamina and power of a large excavator without sacrificing speed or mobility. These features include tubular all-welded steel boom, anti-friction bearings at each important point, cone-type rotating clutches controlled by a single lever, chain crowd for positive control and easy boom adjustment, bevel gears enclosed in oil, guarded boom points, and positive locks on swing shaft, which prevent the upper frame from rotating while propelling.

The ¾-cu.yd. shovel.

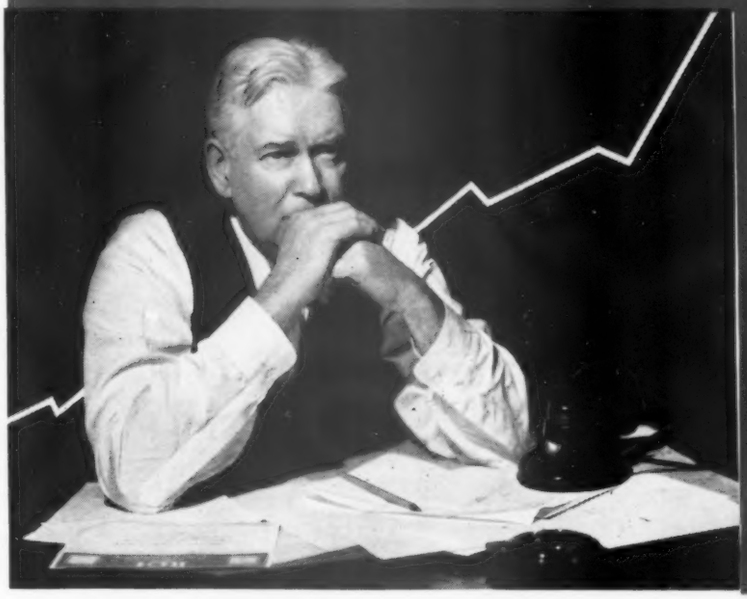
The Marion Type 331 is especially built for highway construction, sand-and-gravel pits and similar operations where a substantial, small machine is needed. It is readily converted from a shovel to pull shovel, crane, clamshell or dragline.

PERFORATED METAL SCREENS
FOR SAND, GRAVEL STONE, ETC.
Manufactured exactly to your specifications.
Any size or style screen, in thickness of steel wanted with any size perforation desired.
We can promptly duplicate your present screens at lowest prices.
Prompt Shipment
CHICAGO PERFORATING CO.
2435 W. 24TH PLACE CHICAGO, ILL.
Telephone CANAL 1459

A dozen workmen can be transported to and from the job in safety and in reasonable comfort with the above passenger carrier being manufactured by the Brooks Equipt. & Mfg. Co., Knoxville, Tenn. The same truck which carries the hoist and attachments for the Brooks Load-Lugger is employed.

PIT AND QUARRY Special Section

PROFITABLE NEW PRODUCTS



AM I GETTING MY SHARE OF THE AGGREGATE AND CEMENT BUSINESS?

● There's a booming market these days for sand, stone and cement—*but are old-fashioned merchandising methods keeping you from getting your share?* Are you forced to sit back and watch the other fellow get the bulk of your area's business by offering concrete materials in the form of ready-mixed concrete? Then, check up on Rex Moto-Mixers. They offer you a proved method for getting bigger year-round volume of sales of concrete materials to the growing list of ready-mixed concrete users. Quality built, engineered for tough service, they are the most profitable foundation for any successful ready-mixed concrete concern—new or old. Send for new catalog!

REX

WHY IT IS MOTO-MIXERS AGAIN IN 1939!

This year Moto-Mixers again bring more cost-cutting features than any other truck mixer, including the new Rex Multiple-Speed One-Lever Transmission. It is illustrated in the new book "This Year and Every Year." Send for your copy today. Main office address, 1646 W. Bruce Street, Milwaukee, Wis.

MOTO-MIXERS AND AGITATORS

CHAIN BELT COMPANY OF MILWAUKEE

TRANSFER STATION SPEEDS DELIVERIES

Sacked cement being transferred from a truck on a skid. The hydraulic lift truck is used to haul the loaded skids into the storage shed.

A batch of sand and gravel being dumped from the ramp into the hopper from which the truck mixers are loaded.

A view inside the cement-storage shed. Each skid holds 15 sacks of cement, the required amount for one batch of concrete.

THE ready-mixed-concrete industry has had a phenomenal growth and in less than ten years of active existence has become a major industry. At first used mainly for building construction ready-mixed concrete is now used for nearly every conceivable type of construction work. Far-sighted producers, realizing that dependence on one type of construction unduly restricted their output and made them susceptible to business slumps, have invaded almost every construction field.

The Arrow Sand & Gravel Co. of Columbus, O., under the guidance of Stephen Stepanian, vice-president, who is in charge of its ready-mixed-concrete operations, was one of the first to develop new markets when building construction declined during recent years. For some time one of the company's main outlets has been sidewalk construction and other work on which W.P.A. labor is used.

Early in the summer of 1938 Mr. Stepanian went after and got a contract to supply all the concrete—about 14,000 cu.yd.—for a large private housing contract in the outskirts of Columbus. The specifications permitted the use of ready-mixed concrete for the foundations, floors and columns of seven apartment buildings, containing 402 apartments and 1,400 rooms, and for the streets and sidewalks. This project is located on 28 acres of what was formerly Olentangy Park, an amusement park, and is the first step of an eventual three-stage development planned for the entire 66-acre site. The L. L. Le Veque Co., Columbus contractor, financed the project and did all the work, except supplying the concrete, which was the only sub-contract let.

As this project is over 6 mi. from the company's permanent concrete plant and its sand-and-gravel plant, delivery of concrete from that point would have required the use of most of the company's fleet of ten 2½-cu.yd. truck-mixers. Mr. Stepanian solved the problem of delivering the concrete by building a temporary transfer or truck-mixer-loading plant on the grounds. This transfer plant made it possible for the company to divert only a few truck-mixers from its regular business. Aggregates were actually batched into dump trucks at the main plant and the water and cement were added at the temporary plant. The concrete haul averaged about ¼ mi., giving ample

• By W. E. TRAUFFER

time for thorough mixing of the concrete *en route*.

The delivery of concrete was begun in June and continued until December, when the job was completed. All the apartments were under roof by September 1 and all were ready for occupancy on December 15. Although the contract called for a maximum of 250-cu.yd. of concrete per day, this was often exceeded and the "peak" demand was 60 cu.yd. in an hr. and 380 cu.yd in an 8-hr. day. Mr. Stepanian believes that this system was capable of supplying 70 cu.yd. per hr. or 500 cu.yd. per day. For "peak" demands only 4 of the company's fleet of 10 truck-mixers were used. These are 2½-cu.yd. Jaeger mixers mounted on White trucks. Because they were not operated on the city streets, where load-limit regulations apply, it was possible to load these mixers to their full capacity of 3 cu.yd. The transfer plant was therefore designed for this capacity. A fleet of 12 dump trucks was required to haul the single batches of aggregates to the transfer plant. This makes it seem quite evident that the company's entire fleet of truck-mixers would have been required to service this project from its main plant.

At the end of the day's pouring the truck-mixers returned to the main plant to help take care of other orders. In the morning they were loaded with 2½-cu.yd. batches of concrete, which they hauled to the housing project to start the day's pour.

The transfer plant was so designed that full advantage could be taken of its location on the side of a hill. Aggregates and cement were brought in on the upper level and the mixer trucks were loaded below. With this system no elevation or mechanical handling of the materials was necessary.

Cement hauling to the plant from a railroad siding 1½ mi. distant was done under contract by the Dolle Trucking Co. As this was only part-time work, the purchase of the additional equipment and the hiring of the additional men that would have been required would have been unnecessarily expensive, according to Mr. Stepanian. The trucks were backed up to the warehouse, the floor of which was on a level with the truck beds. This contract also covered the transfer of the cement from the truck into the warehouse. Use was made of special wooden skids, on each of which 15 sacks of cement, the correct amount for a 3-cu.yd. batch, were stacked. A Barrett 3,500-lb. hydraulic lift truck was used to haul the loaded skids into the warehouse, which had a capacity of about 800 bbl. or about 200 loaded skids.

A Barrett truck was also used to haul the cement out to the charging plat-

A "batch" of cement being hauled on a hydraulic lift truck to the loading platform. Note that the sack openings are all on the same side.

A batch of sand and gravel and a skid-load of cement being dumped into the truck-mixer-loading hopper. The water-measuring tank is at the right.

One of the truck mixers backed up on special wooden skids to discharge into the concrete bucket for street paving.

A view of the transfer plant which shows why no mechanical handling of cement or aggregates is necessary to load them into mixer trucks.

form. In order to avoid delays the cement crew kept a number of loaded skids near the platform where they could be quickly moved into dumping position. The sacks were piled on the skids with all their tied ends facing to one side to facilitate dumping. The wire ties were cut before a load was hauled out on the platform. A slight down grade toward the platform accelerated the moving of the sacks.

The aggregate trucks were backed up on a wooden trestle, from which they discharged their 5.1-ton batches directly into a 3-cu.yd. steel hopper. The cement was dumped from sacks into two boxes, each having a capacity of 15 sacks for one batcher. Actually the cement was poured into these boxes without the sacks being lifted. Only a push was necessary to discharge their contents. The empty sacks are piled on a skid until they total 50 and are then hauled away and tied in a bundle. The use of two boxes further reduced the possibility of delay in loading the truck-mixers. The cement was discharged from one of the boxes simultaneously with the dumping of aggregates from one of the trucks and the discharge of water from a 250-gal. Jaeger tank.

The truck-mixer driver pulling the lever which discharges a batch into the mixer. With his foot he operates the lever which lowers the truck-loading spout into position.

On receiving a signal from the plant operator the mixer-truck driver dumped the batch into his mixer by means of a lever. A conical loading spout was lowered into position by the driver by means of a stirrup on a lever which he operated with one foot.

It is evident that efficient operation of this system depended to a large extent on the delivery of the batched aggregates to the plant as needed. Telephone communication between the gravel plant and the job made it possible to adjust the flow of aggregates to the demand and to stop deliveries when a pour neared completion. Under this system the transfer plant was used to load mixers as long as trucks delivered the aggregates. Trucks were routed to avoid main traffic arteries and congested areas. As a further precaution to avoid delay and accidents in turning on and off heavily-traveled High Street, which is the main north and south artery of Columbus, Mr. Stepanian secured permission from an adjacent property owner to build a two-lane driveway into the plant from an untraveled side street. The hauling of the sand and gravel was done under contract by the Anderson Haulage Co.

Each gravel-truck driver carried with him order slips for the concrete made out in triplicate. One slip was given to the transfer-plant operator and another was kept by the driver. The third slip was lowered in a bucket attached to a cord to the mixer-truck driver, who in turn gave it to the contractor.

At the time of the writer's visit to this operation all the pouring on the apartments had been completed and the streets were being paved. All the pouring on this job was done with a 1¼-cu.yd. Jaeger bottom-dump concrete bucket, which was moved into pouring position by a Marion gasoline crane with a 75-ft. boom. No wheeling of concrete was done at any time. In order to dump into the bucket the mixer trucks were backed up on a pair of wedge-shaped wooden blocks which raised the mixer discharge openings high enough to enable them to discharge into the buckets. At the back end of each block wooden strips attached crossways and projecting on both sides served as backstops and as handles for moving the blocks as the pouring progressed.

The many time- and labor-saving devices used in connection with these operations were developed by Mr. Stepanian, who also designed the plant and the operating methods used. These special methods may seem of little importance individually to the casual reader but together they contributed materially to the efficiency and economy of this operation. On the day the writer visited the plant operations proceeded without a hitch. The truck-mixers were loaded promptly on their arrival and never more than two truckloads of aggregates were at the plant at any time. A truck-mixer is loaded and on its way in less than a minute after it arrives at the plant. On that day three truck-mixers were being used to deliver 250 cu.yd. of concrete for one of the streets in a far section of the development.

Cleanliness is also not overlooked and truck-mixer operators are given prizes every month for keeping their trucks clean.

Old Paving-Brick Firm Making Concrete Units

The Poston-Springfield Brick Co., Springfield, Ill., plans to place on the market a new type of brick for hollow wall construction of homes. The new construction allows cold air from the basement to be utilized in air conditioning the rest of the home by forcing cold air between the walls and into the rooms. The air conditioning by the new brick construction is done without conditioning units.

A new department has also been added to the plant, which has been used in manufacturing brick at Springfield for fifty years, to make concrete blocks, light weight units and precast stone products. New and up to date machinery has been purchased.

Ready-Mixed-Concrete Operators of the Nation Convene at Cincinnati

FOLLOWING a plan adopted more than a year ago, the ninth annual convention of the National Ready Mixed Concrete Assn. was held concurrently with the twenty-third annual convention of the National Sand & Gravel Assn. at the Netherland Plaza Hotel, Cincinnati, January 25 to 27. Some of the sessions were held jointly with those of the sand and gravel organization and what transpired at such joint meetings is reported elsewhere in this issue of PIT AND QUARRY as a part of the report of the sand-and-gravel meetings. References to the latter will be made at the proper points herein. The first meeting of both associations was a joint session, for the report of which the reader is referred to the sand-and-gravel report mentioned.

The separate sessions of the ready-mixed-concrete body began with an afternoon devoted to the technical and operating problems of the industry. On behalf of the Joint Technical Committee, its chairman, R. B. Young, reported progress in the formulation and adoption of various standards of interest to ready-mixed-concrete producers. He mentioned the A. S. T. M. *Standard Specification for Ready-Mixed Concrete,* and commented on the fact that the American Assn. of State Highway Officials is also at work on a specification similar to that of the American Society for Testing Materials.

At the autumn meeting of the board of directors of the ready-mixed-concrete association the appointment of a committee to deal with the formulation of a standard method for sampling ready-mixed concrete and a test procedure to investigate the efficiency of truck-mixers and truck-agitators was authorized and this committee has been organized and is at work. The American Concrete Institute has offered to organize a ready-mixed-concrete committee, if a definite problem requiring study can be suggested by the ready-mixed-concrete association. Some problems of that nature will be suggested. Mr. Young referred to the fact that three members of the ready-mixed-concrete industry are already members of the A. C. I. board of fifteen. Those members are Lion Gardiner, H. F. Thomson and R. B. Young. Other members of the industry are members of the A. C. I. Committee on Measurement, Mixing and Placing.

Mr. Young asked a number of questions touching the efficient operation and administration of the ready-mixed-concrete business. "Are we making use of the data being obtained in our control tests of concrete to further customer confidence or to improve our own mixes or methods?," he asked. "Do we make as much use as we should of the important information being published regularly in the technical press? Are our truck operations hit-and-miss or carefully planned? What do we know about modern methods of fleet operation and how far are they applicable to our industry? Are we learning anything from the concrete-manufacturing methods in use on the big governmental projects now under way?"

The speaker said that there seems to be a tendency to be satisfied with things as they are, to get along with out-of-date equipment and to become slipshod in operating methods. It seems to have been forgotten, he said, that the great improvements made in ready-mixed concrete have been due largely to the fact that the industry made available to its customers the most modern equipment and methods for the precision manufacture of concrete. Mr. Young asked whether the industry was in danger of losing its position of leadership in matters of this kind.

H. F. Thomson, chairman of the Committee on Standards, instead of presenting a formal report, made further comments on the specifications of the A. S. T. M., especially with regard to wider distribution of the standards that have been adopted and the need for closer conformity to them on the part of concrete manufacturers. He referred to the specification on the use of truck-mixers of the revolving-drum type and to the importance of establishing in the minds of specification writers the fact that the association is interested in seeing that the industries' operations are carried on in accordance with the best practice and that close control of quality is maintained. This specification covering the operation of revolving-drum truck-mixers has been amended to include a definite provision that the mixing time shall start after all the materials are in the drum.

With respect to a proposed specification for truck-mixers of the open-top, revolving-paddle type Mr. Thomson said that the manufacturer of that type of equipment had submitted data designed to form the basis of such a specification and that he had been asked to furnish additional information. The preparation of such a specification is in the hands of the subcommittee.

Mr. Thomson quoted from Stanton Walker's report to the association's board of directors' meeting of the preceding day with reference to the specifications of state highway departments. Mr. Walker had said: "Advances which have been made in gaining the general acceptance of ready-mixed concrete are strikingly illustrated by the status of state highway department specifications. Information taken from the 1938 charted summary of highway specifications prepared by the Portland Cement Assn. shows that the specifications of only three states are silent with respect to ready-mixed concrete. All the other states and the District of Columbia make provision for the use of ready-mixed concrete, and in a gratifying number of states the decision in the matter is left to the contractor." Which means, added Mr. Thomson, that not even the approval of the highway department is required in these cases.

Mr. Thomson considers it especially significant that all but three states recognize the use of ready-mixed concrete on the highways.

Mr. Thomson expressed it as his opinion that the continued welfare, continued growth and continued acceptance of ready-mixed concrete depend very largely upon concrete producers pointing out that the production of ready-mixed concrete is a quality manufacturing operation. He believes, too, that even the smallest producer should avoid the limited view that the delivery of ready-mixed concrete is simply an alternate way of delivering materials; and that when one enters this industry he is embarking in a manufacturing business and must assume the obligations that attach to such a business. "We are delivering a building

CONVENTION EXHIBITS

Reading down: Blaw Knox Co., Chain Belt Co., Jaeger Machine Co.

material under different conditions than heretofore," he said, "a material for which we are definitely responsible and which has been brought to its present degree of acceptance largely through its superiority as compared with the former method of making the product." He insisted upon the necessity of surrounding ready-mixed-concrete operations—even the smallest ones—with a kind and an amount of technical supervision that will guarantee the quality of the product.

The ensuing discussion of *Cold-weather Concrete from the Point of View of the Producer and the Consumer* was led by Mr. Young (Ontario Ready Mix Concrete, Ltd., Ontario), who said that one of the most important questions is "At what temperature should concrete be delivered?" From the construction and engineering point of view the concrete should not be any hotter than is necessary. To require temperatures of 90, 100 and 110 deg., as many specifications do, multiplies the troubles. He believes in maximum limits of 80 or 85 deg. for concrete going into structural frames, buildings, and the like. In dam construction—walls 15 to 20 ft. in height—50 deg. is better than 80 deg., in his opinion.

Mr. Young believes that the mixing water should be heated to a temperature of about 160 deg., certainly not more than 180 deg.

In his company's operations in Montreal, where the temperatures are lower than in Toronto, Mr. Young believes it practical to keep the temperature of the fine aggregate around 50 deg. In this plant the materials are reclaimed from tunnels that are slightly above ground-level, and they receive their heat from steam jets placed parallel to and on the top of those tunnels and around the hoppers. The average temperature of the stone is about 40 deg.

For large jobs, where the temperatures in which concrete will be poured are lower than in city construction, the heat in the sand and the water has been sufficient to heat the concrete, and the coarse aggregate has not been separately heated. The heat in the water can be relied on for temperatures down to zero, if the aggregates are defrosted.

Mr. Young believes that live steam is the best medium for heating aggregates, as these are poor conductors of heat and the steam possesses the needed power of penetration. Live steam tends to rise through the interstices between the fine and coarse aggregate, enveloping each particle in a heated bath of condensation, and on falling back by gravity gives up the rest of its heat. By heating the piles of material from the bottom and not reclaiming all the way down to the bottoms all the excess moisture is allowed to return to the bottom 6 or 8 in. of material in the piles.

After the aggregates have been placed in their bins there is no need to do more than conserve the heat already present in the aggregates and prevent them from freezing. Dry steam and coils around the outsides of the bins take care of that, according to Mr. Young, and it is not necessary to supply additional heat. However, in the mornings and after other prolonged shut-downs the first two or three batches may have excesses of moisture, but after these have been adjusted there is no further trouble. The variations in moisture content are no greater than in summer when no steam is used.

Henry Beckley (Beckley & Myers Co., Springfield, O.) said that greater variation in the moisture content of batches results from summer showers and from moisture-content differences between different lots of materials, which are immediately reflected in the batches, than comes from aggregates stored in bins heated by live steam.

R. E. Robb (Scientific Concrete Service Corp., Washington, D. C.) said that in the operations of the Koenig plant in Detroit *(P & Q, Dec., 1938, p. 72)* compensation had to be made for moisture variations 420 times out of 926 batch determinations, working on a quarter of one per cent. variation. This variation amounts to a change of between 77 and 100 lb. per sq. in. in the strength of the concrete. Of the 420 changes made, 184 were changes of 0.25 per cent.; 142 were of 0.5 per cent.; 35 were of 0.75 per cent.; 49 were between 1.0 and 2.0 per cent.; and 10 were over 2.0 per cent. These were batch-to-batch variations.

In the plant mentioned by Mr. Robb the aggregates are heated in their bins with live steam for a half-hour. A 30-hp. upright boiler, putting steam into a 500-gal. drum of water and into three 200-ton bins, kept the aggregates above the freezing point on one job of supplying 170 cu. yd. of concrete. Temperatures of from 70 to 85 deg. were maintained throughout the day. The outside temperature ranged between 20 and 25 deg. The production was at the rate of about 22 to 23 cu. yd. an hr.

Irving Warner (Warner Co., Philadelphia) said that about 1.25 boiler hp. per cu. yd. of concrete hr. is sufficient.

Mr. Thomson drew attention to the fact that one prominent highway department in the Middle West, in specifications very widely used, limits the maximum temperature of all the materials used to 120 deg. This imposes an extra burden on heating the aggregates, if the weather is really cold.

On the subject of water temperatures Mr. Young said that thousands of tests have shown that summer concrete is better than winter concrete. His company has had no trouble in winter, running regularly with water introduced

CONVENTION EXHIBITS

Reading down: T. L. Smith Co., Ransome Concrete Machy. Co., Transit Mixers, Inc.

into the batch at temperatures ranging from 140 to 160 deg. He believes that the losses in temperature in transit to the job are very small. His company allows for a drop of 5 deg. in the temperature of the concrete between the plant and the job.

In Mr. Young's experience construction continued until outside temperatures fell to about 40 deg. below zero. If belt-conveyors or concrete pumps are used to deliver the concrete, a little more heat is needed than if the delivery is to be made in "large chunks" of 1 or 2 cu. yd. Chutes, if used, must be heated.

Stanton Walker led the discussion of *The Effect of the Length of Haul and the Time of Mixing* by referring to the early investigations carried out by S. C. Hollister, who concluded that as long as the mix remains workable there appears to be no variation in strength for mixing periods varying from 40 revolutions of the drum up to about 1½ hr. Practically all specifications which are national in scope are based on that recommendation and the recommendations of others who have confirmed it. Mr. Walker mentioned two other investigators, the late Professor Slater and Miles N. Clair, who have furnished information on this subject.

Mr. Robb, in answer to requests, gave a brief description of the methods used in the Koenig plant by saying, "We are using the principle that Archimedes used on water displacement and it depends upon specific gravity. It involves the determination of the specific gravity of the sand and the gravel. The sand is checked every batch, the coarse aggregate every 3 or 4 batches. The operation consists of weighing out a known amount of the damp sand. The apparatus is set for the specific gravity. You weigh out a certain amount of damp sand, depending upon its specific gravity indicated in water. By the water displacement or by the weight of the finished products—that is, the combination of sand and water—you read the moisture direct. There are no computations. You watch where a hand comes to and stops twice, once when you weigh out the sand and once when you determine the moisture. The compensation is taken care of in a similarly-rapid manner without any computations."

Stanton Walker, engineering director of the association, quoted from a letter from a prominent ready-mixed-concrete producer the following paragraph:

"It is our belief that in the finely-ground cements now in use the danger of overheating is very much greater than formerly. All the test data indicate that temperatures much above 100 deg. result in a lowered quality of concrete. We have recently had inquiries regarding the heating of water for use in concrete in cold weather. In answering these we have taken pains to point out that if the water and the cement are to come in contact immediately at the higher temperature, the water should not be heated above 100 or 110 deg. On the other hand, if the control of the operations is such that the water first comes in contact with the cold aggregates, the picture is quite different."

Mr. Thomson cited an incident to illustrate the fact that concrete can be used satisfactorily for some jobs long after the expiration of the length of time that is generally thought to determine its usability. He believes that the real limit is not fixed by the physical condition of the concrete as it is by the cost of getting it to the job. Presiding officer Alexander Foster, Jr. (Warner Co., Philadelphia) reported similar experiences up to 7 hr. Mr. Robb reported a case where a truck was delayed 3 hr., yet test cylinders checked with those taken from other batches used on the job.

Mr. Foster said that concrete delivered from a central-mixing plant to the job within 45 min. strips more easily than concrete that is poured at the site of the work and is placed immediately. He has suspected that this difference is due to a certain amount of the initial shrinkage having taken place before the concrete found its final resting place.

Stanton Walker said on this subject that he is convinced that "up to some limit, which varies with conditions, the longer we can hold the concrete between the time of mixing it and that of putting it in the forms, the better off we are."

O. P. Steele (Pacific Coast Aggregates, Ltd., San Francisco) said that California state specifications limited the hauling time to 30 min., which has since been increased to 45 min. The State Highway Research Division is conducting tests on the theory that the various cements, various brands of cements, and different mixing speeds—rather than the time that elapses after the addition of the water and the cement—are the factors that must be considered.

Stanton Walker, speaking on the difference between the time of mixing and the length of haul, said that in ready-mixed-concrete operations it is customary to say that there shall be no more mixing than is provided by 150 revolutions at mixing speed. This is ordinarily about 4 or 5 r.p.m. and not greater than around 11 or 12 for not more than 150 revolutions—the idea being to attempt to control the amount of grinding action which may take place in the mixing principally—and then beyond that at the lower-than-mixing speed—agitation speed. The average specification says up to about 1½ hr. A maximum mixing time of about 150 revolutions at mixing speed and any number of revolutions beyond that time, but within the specified time limit of 1 hr. or 1½ hr., is proper, according to Mr. Walker.

The discussion of *Methods of Handling Ready-Mixed Concrete from Trucks to Forms* was led by H. F. Thomson (General Materials Co., St. Louis), who illustrated his remarks with pictures. As it is expected that a more detailed account of his statements, accompanied by some of the illustrations, will appear in a future issue of PIT AND QUARRY, only a very brief *resumé* is given here. He advocated the adoption of a policy of agreeing with the contractor on each job about the rate of delivering ready-mixed concrete and the methods of transferring it from the trucks to the forms. Various activities must be coördinated, so that the contractor, the excavator and the concrete contractor can operate in harmony and with maximum efficiency. In general Mr. Thomson believes that the concrete truck should be brought as close as possible to the point of deposit.

The speaker alluded to the dangers of providing accessory equipment to facilitate the quick handling of concrete to the forms in rendering the contractor too much service. He favors limiting the ready-mixed-concrete business to the production and delivery of its product at the spout of the delivery vehicles. If equipment is provided, the kind, amount and controlling conditions should be the subjects of definite agreement before deliveries begin.

James Kolinski (Central Ready Mixed Concrete, Milwaukee), in response to an invitation from Chairman Foster, told the audience something about his company's experience with the Pumpcrete, a pump for delivering concrete from truck-mixers to the forms. He described a situation in which, but for the Pumpcrete, the contractor would have required three set-ups. He said that contractors and city engineers are pleased with the concrete as it comes from the discharge end of the pump's pipe-line. Deliveries are being made with the Pumpcrete over horizontal distances as great as 1,800 ft. and through vertical distances as great as 128 ft. The consistency of the concrete on its discharge is about the same as it would be if delivered direct from the truck-mixer.

Mr. Kolinski told of encountering more and more restrictions on spouting because of segregation, the "ground stuff going back from the spout and the coarse stuff going forward." This condition is avoided by the use of the pump. He said he had handled over

60,000 cu. yd. of concrete with a pump of this type. He charged the contractor 50 c. a cu. yd. for providing delivery with the pump. He said he made no profit on this phase of the operation, but realized his saving through the fact that it was possible for his truck-mixers to discharge their loads quickly and get away without being forced to drive around the job to the exact point of pouring.

It is better, in Mr. Kolinski's opinion, to have the pump owned by the contractor, because of the union wages and union supervision involved. He said it is a laborers' job to set and open the pipe, although the pipe-plumbers' union wanted to handle the job. The pump engineer's wage rate was $1.50 an hr.

Referring to the pictures of the equipment used to transfer concrete from the truck-mixers to the forms which were shown by Mr. Thomson, George Brooks (Brooks, Wright, Inc., Paterson, N. J.) said that he had had some difficulty when he attempted to place concrete in the contractor's forms. He was not even allowed to place concrete in a sidewalk. The labor unions insisted on his men placing the concrete on the floor and on having it transferred to the forms by buggies.

Edmund A. Lockett (E. Lockett & Son, Pasadena, Cal.) said in this connection that the highway department of his state will not allow a ready-mixed-concrete truck to "pour" any pavement, for the reason that the concrete must be got down to the 8-ft. spout, and that is considered to be "pouring." The department, according to Mr. Lockett, does not believe in "pouring"; its staff calls the operation "placing."

Mr. Lockett questioned whether it is advisable for ready-mixed-concrete producers to go beyond the point of delivery of their concrete and run the risk of criticism because of segregation caused by the handling that occurs after delivery. He thought that producers should concern themselves about what happens to the concrete after it is in the contractor's hands.

Chairman Foster remarked that it would be very helpful if city engineers would place inspectors on each job, requiring them to make sure that ready-mixed concrete would be properly handled. He cited an instance where this was done and where good concrete was so mishandled that it reached the forms in the form of "soup and stone." By refusing to supply any more concrete until the condition was corrected the concrete producer obtained the conditions that were necessary to the provision and placing of a fully satisfactory concrete. He added that construction jobs should be surrounded by rules and regulations and inspection service to provide protection against abuses.

A discussion of *Purchase Specifications for Ready-Mixed Concrete* was led by H. F. G. Pelsue (Graham Bros., Inc., Los Angeles), who said that most of the specifications with which ready-mixed-concrete producers have to deal have been written by "rugged individualists." He believes that engineers should not, for instance, say that material "sizes must be broken at ¾ in. instead of at 1 in." Mr. Pelsue said: "Maybe we are using 1½-in. maximum aggregate, but we must break our sizes at ¾ in. . . . even though our plants are equipped with screens that normally break at an inch. . . . They have a right to expect that the concrete they will receive will be in the proper condition of plasticity, and will result in the compressive strength and durability, and that will give the resultant texture they are after, if it is an architectural finish."

He expressed the fear that engineers have not enough confidence in ready-mixed-concrete producers and are not as familiar with this relatively-new product as they are with old methods.

Sanford Thompson called attention to the fact that the length of mixing time can be varied, but that there can be no variation in the proportions of the aggregates nor in the amount of water. He believes that accurate and automatic control of the pouring of concrete is bound to come. He referred to some of the dams in the West and to a plant about 10 mi. outside London, England, where similar methods are used. Weights are placed on the beams for the individual aggregates, for the cement and the water, and then the instruments are locked and all the subsequent measuring is done automatically. Means are provided for measuring the moisture content of the sand, and one of the beams is regulated so that for a given percentage of moisture in the sand the amount of water to be added is automatically controlled.

James Kolinski described his experience with a special type of box designed to reduce the irregularity of test cylinders. Each box is built to take 6 cylinders and is fitted with a rubber seal. "My idea of building such a box was to take a cylinder, especially in the autumn of the year, delivered at a temperature of 70 deg. and set out on the job. At night the cylinder may generate its hydrating temperature of 70 deg. but a wind may spring up and take the heat away from the cylinder. It doesn't get the proper curing. I sealed a box with rubber to retain the temperature of the cylinders put in it. Instructions inside tell how to take the cylinders, how to tamp them, and so on. We have used boxes of this type for a year and have had no cylinders fail."

In this connection H. F. Thomson drew attention to the fact that there has been a change in the A. S. T. M. specifications regarding the taking of cylinders in the field. These now provide that during the time prior to the cylinder going to the laboratory—that is, the first 24 hr.—it shall be stopped under such conditions that the temperature shall be between 60 and 80 deg. and the concrete in a moist condition. A footnote refers to the possible use of a box for that purpose, possibly one filled with damp sand and possibly heated with a lantern, an electric light bulb, or something of the kind.

Mr. Kolinski added that his company's boxes are set out on the job, probably in the basement, and three cylinders are put in each box at a temperature of about 10 deg. above zero. The inspector closes the cover, snaps the spring, and seals it. There is a thermometer inside. The next morning, when the box is opened, the inside temperature is found to be 90 deg. "Evidently," said the speaker, "the cement generated the heat that was required."

Following the close of this separate session of the ready-mixed-concrete group a buffet supper and reception signalized the opening of the joint exposition of machinery and equipment of interest to concrete manufacturers.

The Thursday afternoon session was held with the meeting of the sand-and-gravel group and is reported in the article dealing with that association's convention.

The morning meeting January 27, was presided over by H. F. Thomson (General Materials Co., St. Louis). It was devoted chiefly to an open discussion among the producers present of various problems connected with the merchandising of concrete and the development of new markets.

H. F. G. Pelsue suggested that the association prepare an illustrated manual to be distributed among the purchasers of concrete. This manual would describe and illustrate the proper ways in which to use and place concrete in order to obtain the best possible results. Later those assembled voted their approval of the preparation of such a manual and passed the matter on to the board of directors for their consideration.

Mr. Pelsue then mentioned the fact that his company and others in the Los Angeles area are furnishing portable job hoppers for large contracts on which ready-mixed concrete is being used. This subject was given considerable discussion as the producers present disagreed on the advisability of this practice. Several operators said that in their territories furnishing hoppers for one contractor meant furnishing them to all contractors, regardless of the sizes of the contracts involved. With a number of contracts running at once this

meant a considerable investment in hoppers which were only in actual use a very small part of the time. Another producer told how he had passed the cost of these hoppers on to the contractors by adding a charge of 10 c. per cu.yd. for the use of the hopper. The contractors were glad to pay this price to avoid having to furnish their own hoppers.

With regard to the establishment of prices for ready-mixed concrete one California producer said that in his territory prices for different quantities are based on the cost to the producer of the quantities of cement required. Contracts requiring less than carload lots pay more than those requiring more than a carload. Where a bargeload or more is used, a further reduction is made. An eastern producer said that his practice is to give a 40 c. per cu.yd. discount on quantities of from 500 to 2,000 cu.yd., another 40 c. up to 5,000 cu.yd., and an additional 25 c. on larger quantities. Orders for less than 3 cu.yd. pay a premium of $1.75 per cu.yd. These prices, he said, are based on an average spread of $1.08 over the cost of the cement and aggregates if the contractor were buying them. Another operator said that his company sells its product at a spread of from $1.00 to $1.95 per cu.yd. over the cost of the ingredients. A middle-western producer gets a spread of up to $1.25 per cu.yd., which decreases for quantities over 100 cu.yd. In addition a charge of $1.15 per cu.yd. is made for the first mile of haul and 15 c. for each additional mile.

Among those present was a ready-mixed concrete producer who, like many other producers, had at one time been a contractor. He said that his contracting experience had been invaluable in selling concrete to contractors because of the insight it gave him into their problems. This knowledge also prevented him from attempting to underbid the absurdly-low costs for which some contractors claim they can mix concrete on the job.

The discussion of market development was led by R. C. Collins of the Warner Co., which operates plants in Philadelphia and Morrisville, Pa., and Wilmington, Del. These three plants serve distinctly different territories and their combined markets cover almost every type of work served by this industry. This fact Mr. Collins used in order to impress those present with the necessity for paying more attention to miscellaneous jobs, which are often considered unimportant. His company in 1937 made 17 per cent. of its total output for miscellaneous jobs of more than 100 cu.yd. each. Miscellaneous work of under 100 cu.yd. accounted for 18 per cent. of the business. In 1938 these two types of work accounted for 21 per cent. and 22 per cent., respectively, of the total sales. He also said that this type of work is more profitable than most others, as the relative lack of competition for it makes it possible to obtain a good price for the concrete. Users in this class also allow more leeway in the delivery of the concrete, making it possible to use this type of demand to fill in slack periods.

Mr. Collins also cited some of his company's experiences in developing new outlets. In Philadelphia, he said, local building stone was formerly used almost exclusively in the foundation walls of houses and small buildings. During the depression the company decided to go after this business. Philadelphia is known as a city of home owners and the percentage of people living in individual houses is far above the average for other large cities. For this reason the market is a large one. The first step was to have ready-mixed concrete approved in the building code. As most of this type of building is done speculatively by real-estate operators and contractors, the problem was to convince them of the advisability of paying a little more for a better basement. After much discouragement a contractor was persuaded to put in concrete basements in nine new houses. These houses sold very rapidly and the contractor was well pleased with the results, which were widely advertised. Ready-mixed concrete is now used exclusively for basements by this contractor and many other contractors in the Philadelphia area. In 1937 the company sold 15,000 cu. yd. of concrete for this type of work. From present indications Mr. Collins predicted that from 35,000 to 40,000 cu. yd. of concrete would be sold for this work by his company in 1939.

Another outlet was developed by prevailing on these same contractors and developers to use concrete as a base for bituminous pavements in these subdivisions instead of the other types of bases commonly used. For this work a 1:3:6 concrete with a low slump is used. A strength of 1,000 lb. is guaranteed, but actual strengths run up to 2,200 lb. A low price was also made possible by delivering this concrete during off-peak periods.

The Warner Co., said Mr. Collins, believes in consistent and continuous advertising as an aid in selling its product. Direct-by-mail advertising is used to reach architects, engineers, contractors, etc., and newspapers reach other classes of business. He recommended that sufficient eye appeal be given to mailing pieces to keep them from going into waste-baskets unread.

The average contractor, according to Mr. Collins, is interested only in meeting, not in exceeding, specifications unless the added quality costs no more. For this reason he advised stressing the advantages to the contractor of using ready-mixed concrete. The average home-owner is more interested in quality and is comparatively easy to sell. Home-owners are easily convinced that quality concrete is more likely to be obtained from a producer than from a contractor, who is less likely to use precision methods of manufacture.

C. P. Maloney (Maloney Concrete Co., Washington, D. C.), said that in his sales territory newspaper advertising was of no value. Contractors using the company's product expected the company to coöperate with them in advertising each building development completed. As the cost of participating in all such advertisements would be prohibitive and the results are small, the company has adopted a policy of no newspaper advertising. Direct-by-mail literature is used to some extent and Mr. Maloney believes that neat-appearing trucks with the company's name boldly displayed are also good advertisements.

A New Jersey producer found that architects in his territory were skeptical of the advantages of ready-mixed concrete. On one job it was found possible to show the architect that 6-bag batches of ready-mixed concrete gave higher and more uniform strengths than 7-bag job mixes. This one case caused a reversal of opinion, which resulted in the wide-spread use of concrete by these same architects.

Another producer, faced with a similar problem, was able to supply ready-mixed concrete to start a job on which job-mixed concrete was to be used. By paying for test cylinders of both types of concrete used this producer was able to convince the builders of the superiority of his product. The ready-mixed-concrete cylinders averaged 3,000 lb. with 5¼ bags of cement per cu. yd. The job-mixed concrete, with 5.6 bags of cement per cu. yd., averaged only 2,400 lb. per sq. in. As a result most of the work done in this area now uses ready-mixed concrete.

A discussion of methods of getting ready-mixed concrete included in building codes and specifications brought out the fact that it is up to each individual producer to see that his product is so included. If the producer does not try to get his product specified, no one else will do it for him.

The last business done by the members present was the election of officers for the coming year. It was unanimously agreed to reëlect all the old officers and directors. They are: President, James F. McCracken (Louisville, Ky.); vice-presidents, J. H. Dixey (New York), H. F. G. Pelsue (Los Angeles), and R. B. Young (Toronto, Ont.); secretary, A. J. O'Connor (Detroit); treasurer, Stephen Stepanian (Colum-

bus, O.). The other directors are: Alexander Foster, Jr. (Philadelphia), H. F. Thomson (St. Louis), and J. L. Shiely (St. Paul).

Preceding the opening of the convention the association's board of directors met and considered the reports of the executive secretary and the director of engineering. Methods for increasing the association's membership were discussed, as well as standards for truck-mixers of various types.

Executive Secretary Ahearn reported on the activities of the association since the last previous board meeting, and referred briefly to some of the problems that have arisen in connection with the cement-purchasing policy of the Procurement Division of the Federal government. He spoke, too, of the policy of the Public Contracts Division on the perishability of ready-mixed concrete. He reported on the association's work in filing against the Old Colony Crushed Stone Co., Boston, a complaint alleging that the company was not a regular ready-mixed-concrete manufacturer and was not, therefore, entitled to bid on government work. In a hearing before the Procurement Division the association's complaint was supported and the company was barred from future bidding and its existing contract was cancelled. This case provided an example of the ways in which a national trade association can act to prevent abuses, such as those that arise from attempts to divert business from its customary and proper channels or to intervene in a broker's capacity where such intervention is not warranted.

Mr. Ahearn spoke also of a letter received from L. Metcalfe Walling, administrator, Division of Public Contracts, Department of Labor, asking, with a view to (1) whether the industry considers it necessary to establish "a great many geographical differentials" or whether the number could be confined to the regions provided in the code, and (2) whether it would be necessary within the respective zones to establish further differentials "based upon metropolitan and rural locations." On these questions it was the feeling of the board that minimum rates for this industry should be determined at the same time as those for the building-material industry.

Director of Engineering Stanton Walker reported on the activities of his staff and the laboratory. He discussed among other things the summary of the status of ready-mixed concrete in highway department specifications prepared by the Portland Cement Assn. This shows the following results:

Conditions of Use	Number of States	States
Both central-mixed and transit-mixed concrete optional with contractor	8	California, District of Columbia, Iowa, Massachusetts, Minnesota, New Mexico, Ohio (when CaCl curing is used integrally), Pennsylvania
Both central-mixed and transit-mixed concrete by special permission or special provision	25	Alabama, Arkansas, Connecticut, Florida, Georgia, Illinois, Indiana, Kansas, Kentucky, Maryland, Michigan, Missouri, Mississippi, New Hampshire, New Jersey, North Carolina, North Dakota, Oklahoma, South Carolina, Tennessee, Texas, Virginia, Washington, West Virginia, Wyoming
Both central-mixed and transit-mixed concrete under certain conditions and with certain requirements	5	New York, Rhode Island, South Dakota, Vermont, Wisconsin
Central-mixed concrete optional with contractor; transit-mixed by special permission or special provision	2	Nebraska, Oregon
Central-mixed concrete by special provision; no transit-mixed	2	Delaware, Louisiana
Central-mixed concrete optional with contractor; silent on transit-mixed	2	Colorado, Utah
Transit-mixed concrete optional with contractor; central-mixed prohibited	1	Nevada
Transit-mixed concrete by special permission or special provision	1	Maine
Specification silent	3	Arizona, Idaho, Montana

With respect to the date and place of meeting of the mid-year directors' meeting the board decided to leave these problems to discussion by a committee consisting of James F. McCracken (the association's president), chairman; V. P. Ahearn (executive secretary); and Stanton Walker (director of engineering). The 1940 convention of the association will be held in the Jefferson Hotel, St. Louis, Mo., January 24 to 26, inclusive, it was announced, as the meeting closed.

Ohio Assn. Meets

The Ohio Ready Mixed Concrete Assn. which was formed April 22, 1938, held a luncheon January 26 at the Netherland Plaza, Cincinnati, O., in conjunction with the annual convention of the National Ready-Mixed Concrete Assn. The Ohio association now has 22 member companies, most of which were represented at the meeting. Stephen Stepanian (Arrow Sand & Gravel Co., Columbus, O.), is president and Claude Clark is secretary. Other officers of the association are: Henry Beckley (Beckley & Myers Co., Springfield, O.), vice-president, and C. E. Ehle (Cleveland Builders Supply Co., Cleveland), treasurer.

At this meeting it was voted to admit machinery manufacturers and dealers to associate membership. A program of activity for 1939 was laid out. Members were also urged to work actively for the passage of a bill before the state legislature to base the state license-tag fees on the actual weight of the truck chassis rather than on the total weight.

Lime Putty Meeting

More than a dozen producers of lime putty met for the second annual meeting of the Lime Putty Products Assn. at the Netherland Plaza, Cincinnati, on January 27. There were no prepared papers, but, instead, producers told of the methods they were using to further the use of aged lime putty and of the success that had followed their efforts. In round-table discussions several producers explained how their businesses are conducted, what products they sell, the prices at which these are sold, how much of each they produced last year, what forms of advertising they had used and found effective, what obstacles in the way of competition and obstruction on the part of engineers and architects they had encountered, and so on.

The following persons were present:
Hayden Brooks, secretary (Brooks-Taylor Co., Birmingham, Ala.).
Glenn C. Cook (Louisville Lime Mortar Co., Louisville, Ky.).
Robert Green (Louisville Lime Mortar Co., Louisville, Ky.).
W. L. Heston (State Sand & Gravel Co., Indianapolis, Ind.).
Norman Hough (Cleveland, O.).
Herbert Jahncke (Jahncke Service, Inc., New Orleans, La.).
Durando Miller (Colonial Sand & Stone Co., New York, N. Y.).
Stanley A. Phillips (Pit and Quarry, Chicago, Ill.).
Russell Proull (State Sand & Gravel Co., Indianapolis, Ind.).

(Continued on page 76)

This Small-City Operator Has Been Supplying Ready-Mixed Concrete for Twelve Years

THE ready-mixed-concrete industry is usually considered to have had its inception in the crowded large cities, where little space was available for a mixer and the storage of aggregates and cement. It is doubtful, however, if many of the present producers of concrete in the large cities outdate the Mississippi Materials Co., of Jackson, Miss., a rapidly growing city which now has a population of over 50,000.

As the Mississippi Concrete Materials Co., this company in 1927 built a plant to produce concrete for a contract held by the Dunn Construction Co. Commercial sales were also made and after the completion of the contract the company was incorporated for commercial production under its present name.

An aggregate-bituminizing plant operated by the company was also built in 1927. Demand has increased steadily and 1938 has been the company's biggest year.

Aggregates are received by railway and are unloaded to stockpiles or at the plant bins by an Industrial Brownhoist steam crane with a ¾-cu.yd. bucket. The plant consists of Blaw-Knox bins and batchers and a 1-cu.yd. Smith mixer. Sacked cement is carried on a belt-conveyor from a warehouse to the batching floor.

Dump trucks were used exclusively to deliver the concrete until 1935, when two used agitator trucks were purchased. A Jaeger 2-cu.yd. agitator was purchased in 1936 and in March, 1938, two Blaw-Knox 2-cu.yd. agitators were added. Dump trucks are now used only for short hauls when the demand is heavy.

The product is accepted for all types of work and much of it is now sold on a strength basis. Most of the demand is for city and private construction, but W.P.A. paving and sidewalks are also important outlets. Concrete has been furnished for jobs requiring over 1000 cu.yds. and orders as small as 1/5 cu.yd. are filled chiefly for good-will. The company recently delivered one rush order for 13 cu.yd. to Vicksburg, Miss., 45 miles west. Five agitator trucks made the trip in 1 hr. and 20 min.

The Mississippi Materials Co. plant showing aggregates storage and crane.

Agitator-truck being loaded at the mixing plant.

Lime Putty *(from page 75)*

John Redd (Super Concrete Corp., Washington, D. C.).
Louis Richter (Richter Concrete Corp., Cincinnati, O.).
N. C. Rockwood (*Rock Products,* Chicago, Ill.).
Murray Simpson (Super Concrete Corp., Washington, D. C.).
Milo E. Smith (Chicago Bridge & Iron Co., Chicago, Ill.).
Stanley Smith (Concrete Construction & Supply Co., Columbia, S. C.).
J. W. Stockett (National Lime Assn., Washington, D. C.).
H. F. Thomson (General Materials Co., St. Louis, Mo.).
Irving Warner, president (Warner Co., Philadelphia, Pa.).
Julius Warner (Richter Concrete Corp., Cincinnati, O.).

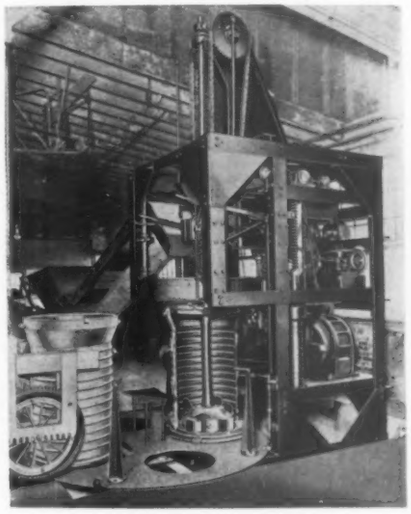
The office of the secretary is at 230 South 31st Street, Birmingham, Ala.

New Machinery and Supplies

• Pipe Machine

The new Dual Packer-Head machine, manufactured by the Concrete Pipe Machine Co., Sioux City, Ia., has revolutionized the packer-head process of making concrete pipe. The machine is made in two models, the stationary for use in permanent or fixed plants and the portable unit. Both produce precision-made pipe of the finest quality, with matchless economy, on either full or partial production. A size range of from 4- to 36-in. pipe is possible on both models and, by actual test, the strength of the pipe, in the larger sizes, has been increased 60 per cent.

This patented process produces either plain or reinforced pipe, permitting two lines of reinforcing or, if desired, one elliptical line. The walls of the pipe are packed under such terrific pressure that a drier aggregate can be used, thus assuring a smoother inner and outer surface. Because the pipe are made bell-end up and because more coarse aggregate can be used, there is a saving of from 10 to 15 per cent. in cement. Walls are rolled to the finest degree of accuracy, insuring perfect alignment, which, together with the new Sealtite joint



Packer-head pipe machine.

prevents all infiltration and minimizes maintenance costs. Pipe are stripped without pallets.

The company also supplies the machine as a portable plant for making pipe on the job.

The portable unit is not sold domestically, but is leased at a fee per ton of pipe produced and is available only to customers owning the stationary machine. Complete protection is guaranteed to all such owners assuring them full benefit of local business.

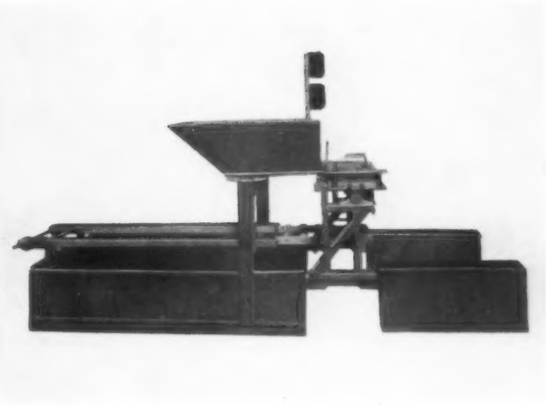
The company also recently announced a volumetric-batcher wheelbarrow. This new barrow assures the same control and uniformity of mix from ground storage piles that the weight or volume batcher gives to those equipped with overhead-bin storage.

Adjustable to 17 different positions, it gives any content from 2 to 4 cu.ft., in graduated ⅛ cu.ft. steps. The large tire prevents its burying itself in surplus sand around ground

PROFITABLE NEW PRODUCTS

The HOLLOSTONE Machine, with a two man crew delivers to the curing yard 150 square feet of 8′ wall per hour. May be set in multiples for any desired capacity.

Vibration is The Answer

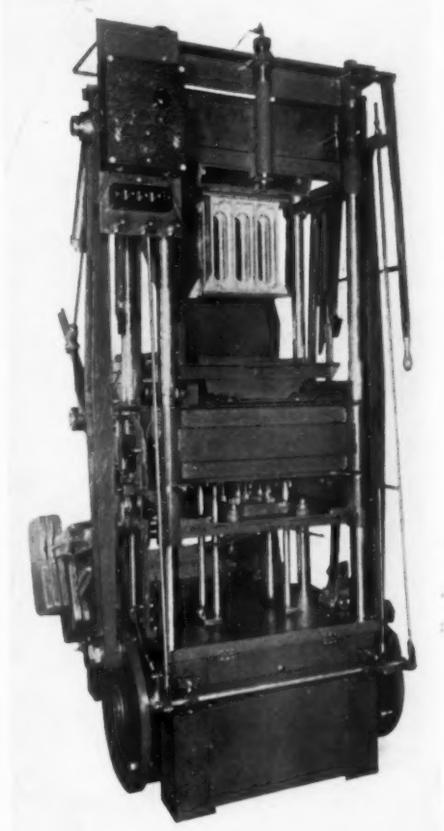


THE HOLLOSTONE PRODUCTS PLANT IN NORTH HOLLYWOOD, EVERY FOUR DAYS MAKES TILE OF VALUE EQUAL TO SALE PRICE OF THE HOLLOSTONE MACHINE.

All sizes on same inexpensive wood pallet 1"x13"x30" easily made in your own plant.

Find out about this before you spend your money for a big machine that costs too much or little one that will not deliver.

HOLLOSTONE MACHINE CO.
7151 Lankershim Blvd.
NORTH HOLLYWOOD, CAL.



KENT-ROOT VIBRA-PRESS

•

A Precision Production Block Machine

•

Vibration and pressing, combined with full-floating mold box and cores produces a superior block, true to size and uniform in density and texture. Rapid in production and universal in its application, the Kent-Root Vibra-Press is adaptable to the manufacture of all standard and special sizes of building units. Equipment for different sizes changed in less than 20 minutes.

The Vibra-Press will be on exhibition at the Concrete Industries Exposition, Feb. 7, 8 and 9, Sherman Hotel, Chicago.

SEE US THERE

•

THE KENT MACHINE CO.
Cuyahoga Falls, Ohio

The RIGHT Kind
of
"PIPE DREAM!"

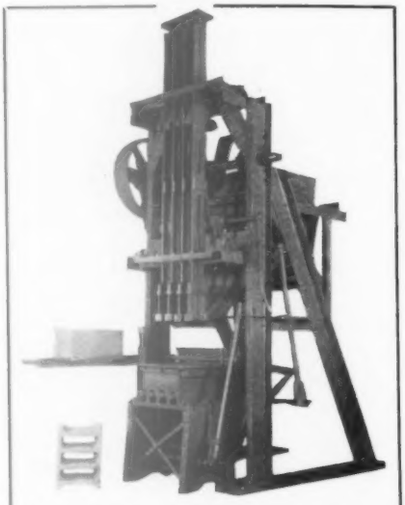
A Universal Concrete Pipe Machine will REALIZE *your* ambition for a personal and profitable business—and make your dreams come true.

A small investment in the Universal "all-purpose" machine will enable you to produce quality pipe at new low cost, in sizes ranging from 6" to 48". Boosts daily production by increasing output per man and footage per bag of cement—raises your returns by "Universal" economy.

Get the facts about this quick way to profits in 1939.

Write for Bulletin

UNIVERSAL
Concrete Pipe Co.
Columbus, Ohio

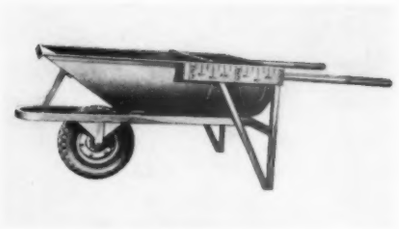


An All-Purpose Machine

The Junior Stripper will turn out more blocks per man than any other hand-operated machine on the market . . . 200 per hour being easily maintained! Nor has quality of output been sacrificed for the sake of speed. Units are uniformly dense, true to shape, of uniform texture.

Hobbs block machines, Anchor tampers, Anchor Jr. strippers, Stearns power strippers and Joltcrete, Stearns mixers, and Cast Iron and Press Steel pallets, Straublox oscillating attachments, etc. Repair parts for: Anchor, Ideal, Universal, Stearns, Blystone mixers and many others.

ANCHOR CONCRETE MACHINERY CO.
G. M. Friel, Manager — Columbus, Ohio

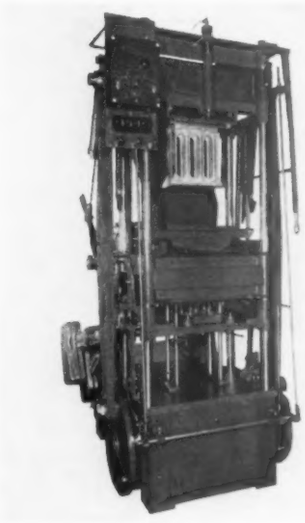


The wheelbarrow batcher.

storage piles, and the wheel is located far enough back to give unusual leverage, making it extremely light to handle.

● Block Press

The Kent-Root Vibra-Press is a machine for making concrete block by a combination of vibration and pressure. Sufficient vibration is provided in the mold box to pack the aggregate thoroughly without setting up such a violent action as to cause separation. This vibration is produced electrically and is not mechanically in contact with main machine members. After the material is vibrated, the block is pressed into final form by upper and lower press heads and while being held between these heads the mold box is stripped from the block and a trowelling apron finishes all sides of the product. With this combination the blocks coming from the machine must be absolutely to size, perfectly square, with fully pressed smooth tops and bottoms and clean cut corners throughout.



New block machine which employs both vibration and pressure to compact the units.

The machine is rapid in production and universal in its application. It is adaptable not only for making block, tile and brick in the common standard sizes but also can easily be arranged to manufacture any and all sizes from the smallest to the largest building units. Not only is it arranged for different sizes but it is also easily and simply changed for any variety and shape of block that may be required by the contractor. The machine is provided with a master mold box within which any variety of inner mold box may be inserted dependent upon the size and shape of the required unit. The change from one size of inner mold box equipment can be made in less than 20 min., thereby keeping the machine in practically continuous operation no matter how often changes are made to meet the requirements of a well-balanced stock in the yard or to meet special requirements. Noteworthy also is the fact that by a simple adjustment the amount of material to be pressed can be regulated to suit load requirements imposed by varying building codes. Obviously then, less material need be used for non-load bearing blocks than for those to be under loading. This adjustment is also to advantage in case varying types of aggregate are to be used in the block.

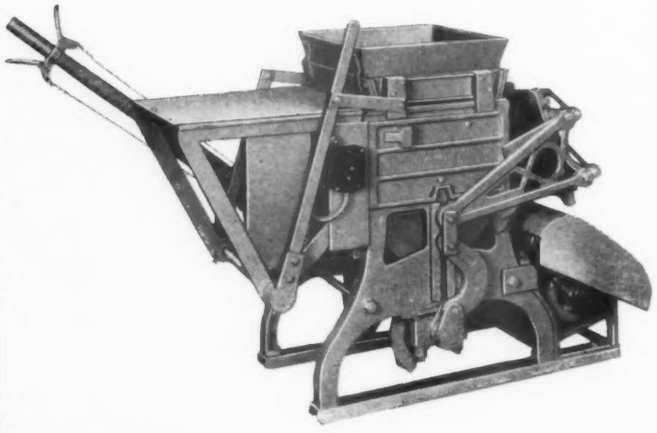
The Vibra-Press is a self-contained unit with motor in place, with V-belt and geared drive to the production-control shaft. It is built by the Kent Machine Co., Cuyahoga Falls, O.

● Vibrator-Stripper

The Multiplex Concrete Machinery Co., Elmore, O., has adapted vibration to its Master Press and Model C Double Stripper and plans to exhibit them at the Concrete Industries Exposition in Chicago Feb. 7 to 9.

The stripper, a hand-operated machine illustrated below, has been used for many years by a large number of plants and produces two blocks in one operation. It is convertible for the manufacture of almost any size or type of concrete unit. When adapted to operation as a vibrator, a small 1-hp. motor supplies the power for three selective vibrating speeds. Because of variations in aggregates, the company stresses the importance of the three vibrating speeds.

The Multiplex company manufactures a complete line of concrete-products plant equipment including both power- and hand-operated machines for molding the units, mixers, cars, elevating equipment and pallets. The development of its variable-speed vibrating attachment is expected to be extended to other machines in its line and it is also available for attachment to machines already in use.



The hand-operated stripper equipped with a 1-hp. motor which imparts vibration to the mold box.

• Batching Plant

The Heltzel Steel Form & Iron Co., Warren, O., has introduced a portable plant for batching bulk cement designated as Model E-1. This plant is completely assembled at the factory and shipped on a flat car so that assembly is a simple matter, requiring less than 4 hours time.

The columns are of one-piece construction —no hinged sections to weaken the structure —platform supports are an integral part of the bin proper assuring maximum rigidity— hopper slopes are purposely unequal being 60 deg. on the long side, so as to naturally break up arching. The valleys in the bin are pressed square to round leaving no sharp corners in the hopper in which the cement can build up. As a further insurance against arching a bank of non-clogging air jets is provided around the throat of the bin. The bin is smooth on the inside and free from obstructions. The manhole cover can be opened from the ladder— the air vent, electric full bin signal and take up bearings in the head section of the elevator are located near the ladder which extends above the bin cover providing safe hand grips when stepping from the ladder to the top of the bin.

The flow of cement from the bin to the batcher is controlled through the Heltzel rubber-tubular valve. An emergency cut-off gate is provided between the valve and the bin

Portable bulk-cement plant.

proper. Seated in sponge rubber the cone-type discharge in the batcher prevents any sifting of cement before the batch is discharged. A pressure relief pipe from the batcher to the top of the bin carries the cement dust back into the bin eliminating the usual accumulation of cement on the operating platform and on the outside of the batcher.

The screw conveyor and elevator has a normal operating capacity of 30 tons per hour. All machinery parts are over-sized for long life. Elevator drives and housings are "built-in" the bin structure and the chain is oversized for maximum wear. Equipped with heat-treated malleable-iron buckets the conveying and elevating equipment should give many long years of satisfactory service.

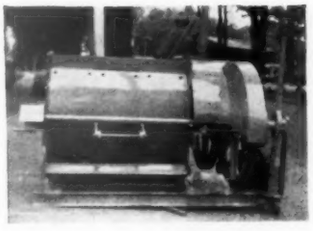
The standard Model E-1 is equipped with a 16 cu. ft. batcher for 1 and 1½ cu.yd. batches. However where operations require 2 or 3 cu.yd. mixes, 20 and 30 cu.ft. batchers are available. Should larger storage capacities be required, extensions can be furnished.

1, 2, 3! GOOD REASONS for *Multiplex* Superiority

For the man who wants to make quick profits for a small investment in *concrete block machinery*, Multiplex Equipment is a *sure thing*.

MULTIPLEX SUPER TAMPER is a heavy duty unit that combines low-cost production with minimum upkeep. Produces perfect 8″ x 8″ x 16″ blocks up to six per minute. Suitable for brick, tile or blocks of distinctive finish. Position-time feeding and stripping with positive strike-off to assure perfectly finished units. Patented feeder, adaptable for all kinds of aggregates. The Super Tamper is a real leader in modern concrete block machinery.

MODEL "C" DOUBLE STRIPPER is a wet-process machine that does not require power nor skilled labor. Two men, using mixed material, can make up to 1000 units per day. Extra strong and durable construction with "fool-proof" operation. Makes two blocks in one operation, plain or faced design, in sizes from 3″ to 12″ wall thickness and standard 16″ in length. With one of these machines you can meet competition anywhere.



NEW MULTI-MIXER, shown with motor drive and side discharge. Latest and most efficient design on the market. The exclusive *reverse screw type action* insures a superior, low-cost mix.

Send for this Booklet

The Multiplex
CONCRETE MACHINERY COMPANY
ELMORE, OHIO

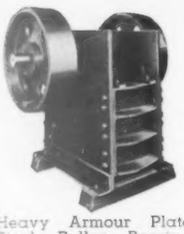
LOW COST ROCK CRUSHING FOR 54 YEARS

What are your Crushing Problems?

The GRUENDLER ORGANIZATION has your answer:

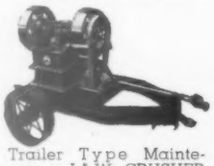
With all the skill, precision and experience gained in Manufacturing Reduction Equipment for 54 years, your particular requirements will be met considering every measure of Economy and Efficiency.

The Engineering Staff will gladly assist you in your Rock, Gravel and Sand crushing, sizing, conveying and storing problems. Plans will be furnished on any size stationary or Portable plant required. WRITE TODAY!



Heavy Armour Plate Steel Roller Bearing JAW CRUSHER.

All cast steel Roller Bearing JAW CRUSHER.

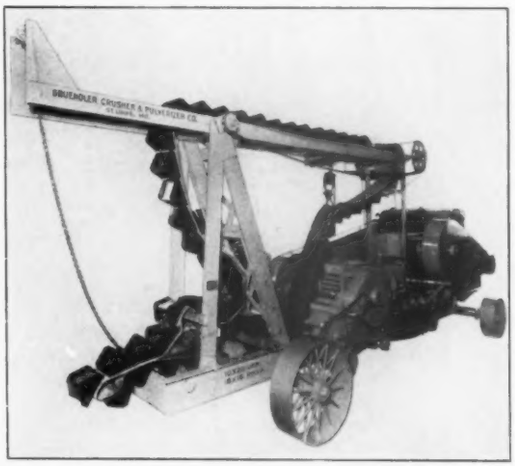


Trailer Type Maintenance JAW CRUSHER with Universal Drive.

VIBRATOR SCREENS in all sizes.

Heavy Duty Revolving Screens up to 84 inch diameter.

Jack Leg Steel Bins. Manufactured in sizes 5-15, 21-30 and 35 ton capacities. Also stationary knocked down bins up to 100 tons capacity.



Designed to do an Economical Crushing job (another GRUENDLER ENGINEERING DEMONSTRATION)

A new Combination Portable Plant—Both JAW CRUSHER and ROLL CRUSHER, all mounted on one frame.

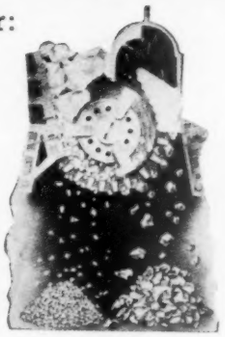
For producing finer aggregate for black top this Combination Plant performs the work economically in one compact movable unit—whereas if several stationary units were built to do identical work, it would not be as economical.

GRUENDLER

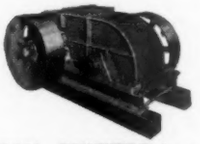
CRUSHERS - PULVERIZERS - GRINDERS

Offices in Principal Cities

Portable Crushing and Gravel Screening Plant. Capacity 60 yds. to 100 yds. per hr.

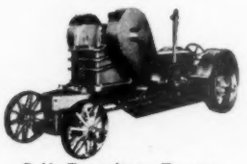


HAMMER CRUSHERS From 1 ton per hour to 500 tons per hour Capacity.



ROLL CRUSHERS from 18" to 40" diameter.

Portable TWO-IN-ONE Hammer Mill for both Rock Crushing and Lime pulverizing.



Self Traveling Tractor Operated Maintenance JAW CRUSHER.

Four Wheel Maintenance JAW CRUSHER with Power Unit.

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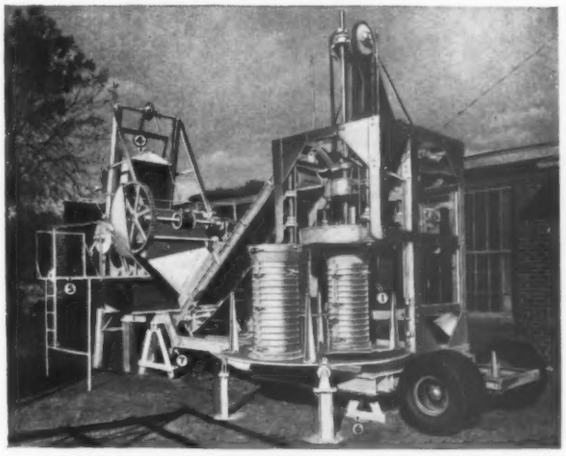
DUAL PACKER-HEAD CONCRETE PIPE MACHINE

Gives you 2 Distinct Advantages

IN PRODUCING 4 INCH TO 36 INCH REINFORCED CONCRETE PIPE



Model T Portable Plant ready for operation

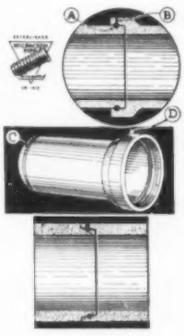
Model T for permanent plant. All plants equipped with this money-making machine entitled to lease Portable Unit.

1. The New Portable Dual Packer-Head pipe machine cuts the transportation cost out of pipe manufacturing completely. Vastly increases your trade territory and makes it possible for you to meet competition almost anywhere. Uses local labor and material and manufactures the pipe right on location.

What better arguments could you present in securing pipe contracts — contracts which will mean greater profits for you than ever before?

2. McCracken concrete pipe as made with the Dual Packer-Head machine save from 10 to 15% on cement, because New Roller Head permits use of more coarse aggregate. The New Sealtite joint, together with the perfect alignment entirely feasible with our new Alignment Perfector, prevents infiltration and practically eliminates maintenance costs. McCracken pipe more than withstand all standard tests and are preferred by the most exacting engineers. The popular length of these highly superior pipe speeds up installation and reduces pipe-line construction costs.

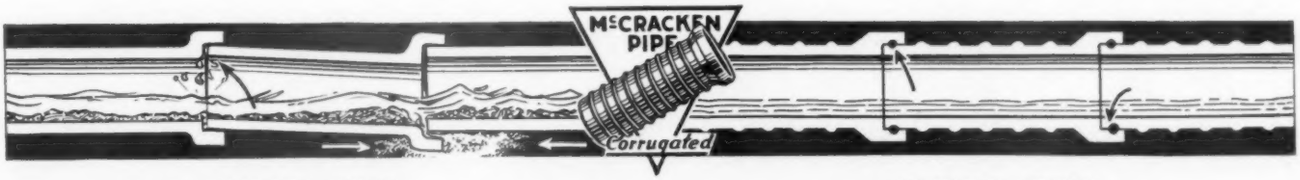
McCracken pipe are now being made by 45 domestic and 21 foreign manufacturers.



The New Sealtite Joint, which adds many years of low-cost service to the sewer line, can be made on either bell-and-spigot or tongue-and-groove pipe. A, above, Groove in bell-and-spigot. B, Joint compound — either bituminous or cement mortar. C, Half-round groove on spigot end of pipe. D, Filling-hole on bell end of pipe.

Send for Free Folder on New Portable Concrete Pipe Machine and unique leasing policy.

CONCRETE PIPE MACHINERY CO.
Sioux City Dept. P-1 Iowa, U. S. A.



AVOID THIS **ATTAIN THIS**

DESIGNED for PROFITS

Universal Equipment at Grove Stone & Sand Co., Grovestone, N. C.:

10"x36" Roller Bearing Jaw Crusher.
40"x20" Crushing Rolls.
10" Horizontal Rail Grizzly.
48"x8' Revolving Scrubber.
Three-deck Gyrating Screen.
80'x24" Feeder Conveyor.
Mechanical Feeder.
32'x18" Return Conveyer.
59' Gravel Elevator; 24" Buckets.
59' Sand Elevator; 14" Buckets.
(Plant designed by the Universal Crusher Company)

by UNIVERSAL

Again, Universal engineers have scored. This time by converting an unprofitable, obsolete operation into a modern, high capacity, low cost per ton plant. A plant that will pay profits from the start, on every ton, and for years to come. Don't gamble — consult engineers who know and manufacturers who produce quality equipment. Over 33 years of tackling and licking tough jobs enables us to turn out clean gravel and sand at a profit from this loamy deposit and with half the power used by the old plant!

Whether it's a stationary, portable or semi-portable plant or merely a crusher — you're getting the "cream" of experience when you call in Universal men. It's their "main line," not their side line. How about "Universalizing" your plant into greater yardages and increased profits?

UNIVERSAL CRUSHER COMPANY
619 C Avenue West, Cedar Rapids, Iowa

UNIVERSAL

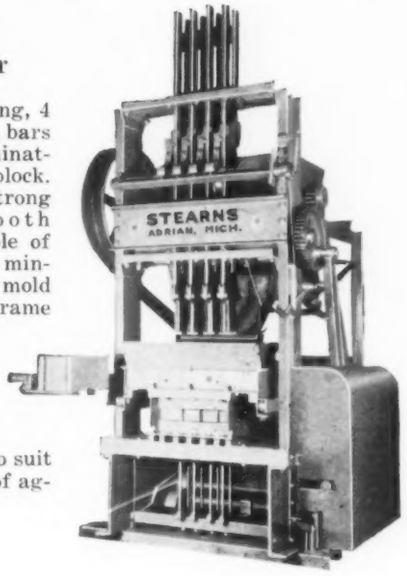
Buy a Machine of *Proven* Worth

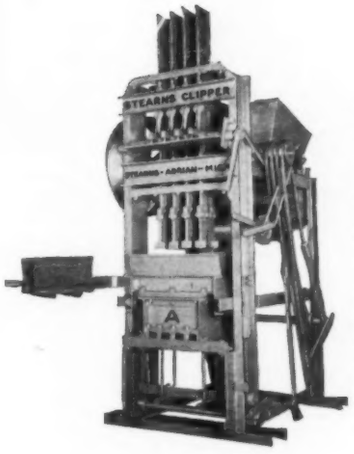
STEARNS JOLTCRETE MACHINE

Not an ordinary vibrator—not just a tamper or press assisted by vibration—but a machine that vibrates the concrete in the mold box with vibration of limited amplitude—vibration under pressure—subjecting the concrete to 7,200 blows per minute. Maximum number of blocks per bag of cement. Blocks are clean cut, true to size, uniform in texture, no planes of weakness, no core bar ridges. Blocks lay up with straight, true mortar lines. Operates automatically, three cycles per minute and at each cycle makes three 8x8x16 or two 8x12x16 blocks, or eight 8x3x18 blocks, twenty-four bricks or any other combination of units fitting a mold box 18x24 in., 12 in. high. Uses your present cored pallets or inexpensive new ones. Made also in two smaller sizes. Fully protected by U. S. and Canadian patents.

STEARNS
Power Stripper

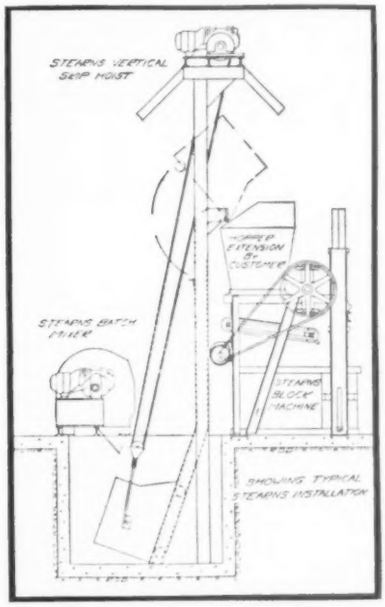
Multiple-bar tamping, 4 in. greater tamp drop, bars drop alternately, eliminating vertical seams in block. Makes dense, strong blocks, with smooth pressed tops. Capable of making six blocks per minute. Quick change mold box with heavy steel frame and reversible liner plates of abrasion resisting steel. Feeding, tamping, stripping and finishing operations may all be governed to suit size of unit and kind of aggregate.





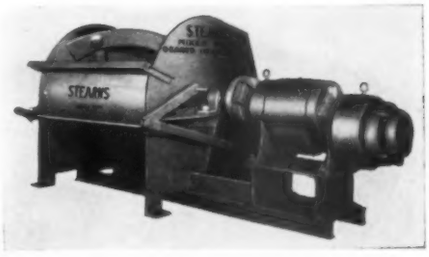
STEARNS
Clipper Stripper

Ideal for small plants and, in batteries, achieves low production costs in large plants. Multiple bar tamping produces dense, uniform blocks, increases block yield per bag of cement. Available in five models with power tamping from manual feeding and stripping to the all power outfit, Model A, shown here. Down-face attachment available.



STEARNS SKIP LOADERS

for charging dry materials into elevated mixers or for elevating mixed concrete to feeding hoppers. Independent and mixer drive types. May be used with any make of mixer. Proper track and cable lengths permit wide range of application.



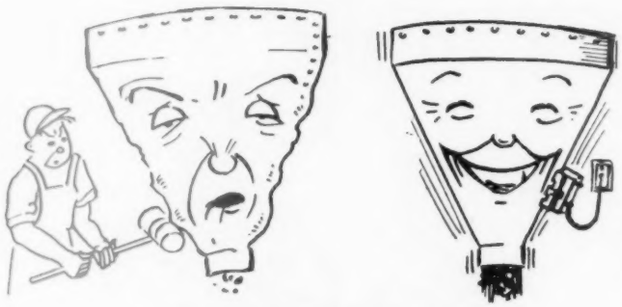
STEARNS MIXER

The mixer with interchangeable, renewable bar type liners of tough, abrasion resisting steel. "Sterloy" ribbon blades. Heavy steel shell electrically welded to steel ends. Quick opening, tight locking door. Low charging height. Large ball bearings perfectly shielded. Pulley, V-Belt or Gear-Head Motor Drive (Shown above). Skid or truck mounting.

Complete Concrete Products Plant Equipment

STEARNS
MANUFACTURING CO. - ADRIAN, MICH.
GENE OLSEN, PRESIDENT

Write for folders on the machines you are interested in.



SYNTRON

"ADJUSTABLE POWER"

ELECTRIC VIBRATORS

ON HOPPERS AND CHUTES

WILL PREVENT ARCHING AND PLUGGING

AND ON

PRECAST CONCRETE FORMS

WILL ACCOMPLISH PERFECT COMPACTION

Write for our new 1939 catalogue

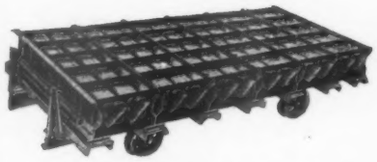
Syntron Co., 385 Lexington Ave., Homer City, Pa.

MFRS. OF THE FAMOUS

SYNTRON

ELECTRIC HAMMERS

START A NEW BUSINESS



This shows one of our Multiple Molds for casting 8x8x16" concrete blocks. We manufacture a complete line of Multiple Molds for blocks (both Rockface and plain), for brick, veneer blocks, etc. We are also owner and originator of the ZAGELMEYER SYSTEM of granite veneer for blocks.

Make

ZAGELMEYER

Waterproof Concrete Blocks

No Other System Produces a Block Equal to This!

A Start May Be Made With as Little as $500.00

The Zagelmeyer System of casting cement blocks in multiple molds produces a block that no other system can equal. Competition is eliminated. No better granite-face, water-proof block is made. This is your opportunity for good profits. Many good territories open. Write today for further information.

Zagelmeyer Cast Stone Block Machinery Co.

502 S. Henry St. BAY CITY, MICH.

LOW IN OPERATING AND UPKEEP COSTS

MORE PROFIT FOR YOU--

And a new way to overcome competition by enabling you to deliver better mixed, maximum strength, high quality concrete *at the lowest possible cost.*

Write for the facts.

Ransome

CONCRETE MACHINERY CO

DUNELLEN, NEW JERSEY

COMMERCIAL PALLETS

New Type—More Rigid—Closer Core Box Fit

Produce Better Blocks with Mortar Grooves and Sharp Edges

No Loss in Pallet Investment Through Breaking or Cracking

Cheaper and Lighter Than Plain Steel Pallets

45%-50% Air Space Utilized in Curing

Write for Catalog

or

Ask Your Machinery Maker

The COMMERCIAL SHEARING & STAMPING COMPANY

YOUNGSTOWN, OHIO.

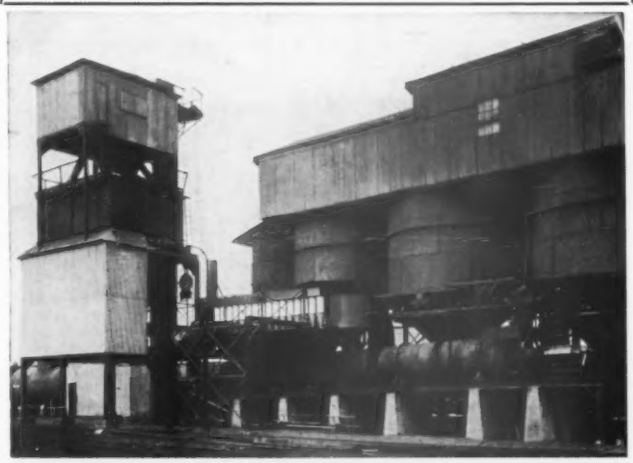
WARNING

THE STEARNS MANUFACTURING CO., of Adrian, Michigan is the sole and exclusive licensee of the basic and broad patents, and patent applications, on JOLTCRETE vibration block machines, which we own. Among the many revolutionary features embodied in these machines is the application of pressure on the concrete mass while the concrete mass is subjected to vibration.

Any manufacturer of machines illegally duplicating or copying features protected by the claims of patents already issued, and to be issued under pending patent applications, will be prosecuted to the full extent of the law.

All users of block machines should guard against the purchase and use of infringing machines in that they are equally liable to infringement prosecution.

JOLTCRETE, Inc.
350 Madison Avenue
New York, N. Y.



WARREN ASPHALT PLANTS

HOT MIX —— COLD MIX

— OR —

COMBINATION UNIT FOR BOTH TYPES

CAPACITY DESIGN AND ARRANGEMENT TO MEET ANY REQUIREMENTS

Designed and Built
— By —
WARREN BROTHERS ROADS CO.
P. O. BOX 1869
Boston Massachusetts

No Troublesome, Leaky Hatch to Open, Close and Keep Clean!

SMITH-MOBILE gives you the fastest loading cycle in the industry. It actually saves about two-thirds of the time required by old style truck mixers for the complete loading cycle. Here's why:

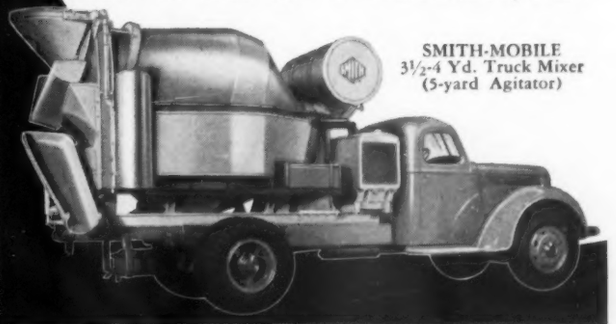
Old style truck mixers lose valuable time while driver climbs out of cab, stops drum, climbs on top of mixer, opens hatch, climbs down, gets into cab and drives mixer under the bin. After the mixer is loaded, the above process must be repeated in reverse with the additional operation of cleaning the edges of the hatch so it can be closed.

SMITH-MOBILE eliminates all these tedious operations. Standard equipment includes a big, roomy feed chute, easy to spot under bin gates. Driver can remain in cab. When mixer is loaded, he drives to the job immediately, with no delays for the unnecessary operations enumerated above. This means more loads per day—GREATER PROFITS.

Since the drum revolves during the charging operation, mixing and shrinking of batch start instantly, greatly increasing the load capacity. And don't forget, Smith-Mobile's HIGH DISCHARGE permits steeper and longer distributing spout . . . discharges directly into high forms. No hoist or ramp required.

Write for Smith-Mobile literature.

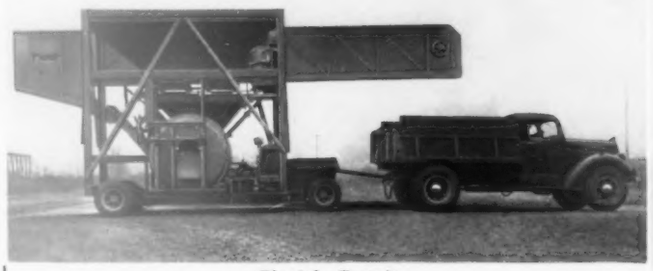
The T. L. SMITH COMPANY
2867 N. 32nd St. • Milwaukee, Wis.



SMITH-MOBILE
3½-4 Yd. Truck Mixer
(5-yard Agitator)

SMITH-MOBILE
THE *Modern* TRUCK MIXER and AGITATOR

STRAYER PORTABLE CONCRETE PLANT



Plant in Transit

A complete portable mixing plant which reduces transportation time and cost to a minimum, saves costly set-up charges and avoids delays in starting concreting operation.

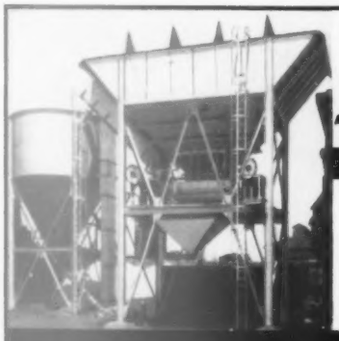
A plant with all controls centralized requiring, exclusive of cement handling, only one man for operation and having but a single power unit driving the mixer and elevator, thus reducing initial, operating and maintenance costs.

A plant compactly built to meet highway clearances but with the necessary equipment to produce 32 cubic yards of concrete per hour.

Write for details.

Plant Ready to Operate in One Hour's Time

ERIE STEEL CONSTRUCTION CO.
Erie, Pennsylvania



Heltzel
BUILDS IT BETTER

READY-MIX CONCRETE PLANT
300 ton 5 Compartment Aggregate Bin • 1200 bbl. Bulk Cement Bin • 5 yard Truck Mixer Batcher.
ONE MAN OPERATION

HELTZEL STEEL FORM & IRON CO.
WARREN, OHIO, U.S.A.

BARRETT LIFT-TRUCKS
ONE MAN HANDLES 48 BLOCKS NO BREAKAGE

Available for fifteen days free trial without obligating you to buy.

Handle your green concrete products the way that more than 800 other concrete products plants do, WITH BARRETT LIFT-TRUCKS EQUIPPED WITH A SUPER-SPRING FRAME AND RUBBER TIRES. Eliminate breakage—joggling out of shape and spoilage. Save time, money and labor by eliminating all unnecessary handling and breakage. Take your blocks direct from the machine to the curing room—with ease and dispatch. One man handles 48 blocks of the 8x8x16 size—or, 32 blocks of the 8x12x16 size.
Write for illustrated circular.

BARRETT-CRAVENS COMPANY
3251 West 30th Street CHICAGO, ILL.
Representatives in all principal cities

NEW Sewer and Culvert Construction

By making concrete pipe on the job with Quinn Forms you give more men more work, can use less experienced labor and produce uniform concrete pipe of highest quality. Recognized standard of all concrete pipe.

QUINN PIPE FORMS

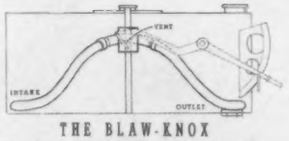
Quinn Heavy Duty and Medium Duty Pipe Forms best for hand or wet process pipe. Give more years of service. All diameters—12 to 84 inches. Tongue and groove or bell end pipe, any length.

WRITE for New Book on Concrete Pipe giving information and prices, valuable tables on production costs, strength tests, Pipe Forms, Pipe Machines, etc. Book sent free.

QUINN WIRE & IRON WORKS 1627 12 St. Boone, Iowa

"WATER CONTROL?

The BLAW-KNOX TRUKMIXER has the most accurate water measuring systems for all positions of the tank"



THE BLAW-KNOX
WATER MEASURING SYSTEM

Tests show—only Blaw-Knox TKUKMIXERS have this accurate, practical, dependable water measuring system. Described in Bulletin No. 1643.

Buy Blaw-Knox Trukmixers. Get the advantage of automatic accurate water measurement, together with many other exclusive features.

20

BLAW-KNOX TRUKMIXERS and Agitators

BLAW-KNOX DIVISION
OF BLAW-KNOX CO.
Farmers Bank Bldg. Pittsburgh, Pa.

SEVEN MATERIALS IN ONE BIN?

"You Bet—this new BLAW-KNOX plant accurately measures and loads aggregates, cement, and water into truck mixers."

Blaw-Knox Truck Mixer Loading Plants include overhead storage bins for aggregates and cement; accurate Weighing Batchers for aggregates, cement and water; arranged for manual or automatic operation; complete conveyors for handling materials from cars or trucks to bins, when desired—all properly designed and built to your requirements as an efficient unit for truck mixer loading. See Blaw-Knox Catalog No. 1582

15

BLAW-KNOX TRUCK MIXER LOADING PLANTS

BLAW-KNOX DIVISION
OF BLAW-KNOX CO.
Farmers Bank Bldg. Pittsburgh, Pa.

Your SURPLUS AGGREGATE

A SOURCE of REAL PROFIT

AGGRESSIVE PRODUCERS LIKE Riverside Sand & Gravel Co., Thiensville, Wis.—Consolidated Rock Products Co., Brooksville, Fla.—W. P. Rose, Goldsboro, N. C.—Consolidated Quarries of Georgia—Georgia Mineral Products Co., Tate, Ga.—are converting their surplus aggregate into profits and in this way selling it as high as $12.00 per ton.

DUNBRIK AND DUNSTONE fulfill modern building requirements — lighter weight—accuracy—greater strength. They can be produced in a complete range of colors, shades and textures. DUNBRIK Manufacturers' sales are running into millions. For instance one sold over three million in the first year, another averages over 250,000 per month and another sold 39 out of 45 home builders.

WE EQUIP YOU with new and revolutionary line production machinery, permitting large production with only one or two men. Equipment costs but a fraction of what would be required for other processes of equal capacity.

INVESTIGATE. Write today and ask for "4 Keys to Manufacturing Success."

W. E. DUNN MFG. CO.
420 W. 24th Street HOLLAND, MICHIGAN

JAEGERS GIVE YOU *a recognized advantage*

. . . . a Higher Strength, More Workable Concrete, Preferred by Engineers and Contractors . . .

Plus the Most Efficient, Low Cost Mechanism Yet Developed for Transit Mixing and Delivery . .

More concrete is sold by Jaeger Truck Mixers than by any other method—now exceeding $30,000,000 worth per year —and the demand KEEPS ON GROWING.

Here is one business that offers opportunity—to make a better profit than you could ever earn by selling bulk materials, to expand your present sales of "ready-mixed," or to establish a new business with the advantage of known quality in your product and greater efficiency in your operating equipment.

Write today for our new Specification TM-39, giving data of essential importance to present and prospective operators of ready-mix plants.

THE JAEGER MACHINE COMPANY
602 Dublin Avenue Columbus, Ohio

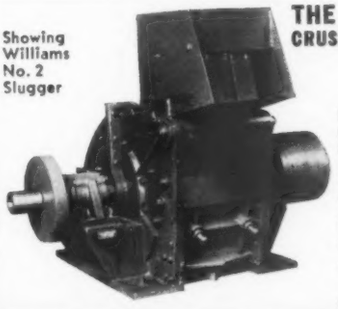
JAEGER

Stripping Costs High?

Check up on S-D Automatic Bottom Dumping Trailers. The trailer that gives you continuous operation . . . discharging and closing on the run, with no auxiliarly powered mechanisms. Built for heavy service and easy, fast manipulation. Here's the trailer for stripping hauling and dumping costs to rock bottom. Let an S-D engineer tell you why.

SANFORD-DAY IRON WORKS, 702 DALE AVENUE, **Knoxville, Tenn.**

Showing Williams No. 2 Slugger



THE WILLIAMS "SLUGGER" CRUSHER *for* MAKING 1¼", ¾" OR AGSTONE HANDLES LARGE STONE

Rows of heavy, free swinging, fast revolving hammers, crush the material by impact until of proper size to pass through the grates. By reducing large rock to 1¼", ¾" or agricultural size in one operation, the "Slugger" has enabled operators to produce these sizes at a very low cost per ton and with small investment.

WILLIAMS PATENT CRUSHER AND PULVERIZER COMPANY
802 St. Louis Ave. - St. Louis, Mo.

WILLIAMS
PATENT CRUSHERS GRINDERS SHREDDERS

$17.50 PER SET

CAN BE QUICKLY ATTACHED TO YOUR OWN GRINDING EQUIPMENT

ROCK BITS KEPT SHARP

and drilling goes faster with a Pacific grinding attachment . . . Simple, convenient, practical . . . Any handy man can use it . . .
No special form wheels needed . . . Designed for standard wheels easily obtained from your nearby dealer.
The parts comprising this attachment are shown in lighter areas in above illustration. When desired, we can supply the complete unit including wheel, electric motor, etc.

When ordering specify MAKE AND THREAD SIZE of bit to be ground.

Ask Your Dealer

PACIFIC Detachable Drill Bit **GRINDER**

ALLOY STEEL & METALS CO.

1862 E. 55TH STREET • LOS ANGELES, CALIF., U. S. A.

Manufacturers of Pacific Jaw Crushers · Pacific Bit Grinders
Handy Hoists · Machinery Wearing Parts

Economical

On All Material Handling Machines. *Try It!*

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Factories:
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ROUND
SQUARE
SQUAROUND*
HEXAGON
PERFORATED PLATE
of every description
for maximum productiveness from your vibrating screens.
*Reg. U.S. Pat. Off.

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Sales Offices in Principal Cities. Please Consult Telephone Directory

CYLPEBS

Cylindrical Grinding Bodies
of
Special Hard Composition
for
Pulverizing Mills

F. L. SMIDTH & CO.
225 Broadway New York, N. Y.

McLANAHAN EQUIPMENT

for ROCK—SAND—GRAVEL

Single and double roll and jaw crushers, hammer mills, super dry pans, steel log washers and scrubbers, sand drags, revolving and vibrating screens, elevators, conveyors, dryers, jigs, hoists. Complete portable, semi-portable and stationary crushing, screening and washing plants for different capacities of any materials.

McLanahan & Stone Corporation
Established 183[illegible]
Hollidaysburg, Pennsylvania

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

Although every effort is made to insure accuracy and completeness in these listings, the publisher cannot accept responsibility for errors or omissions. Any mistakes discovered will gladly be rectified.

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Aggregate-Bituminizing Plants
Hetherington & Berner, Inc.
McCarter Iron Works, Inc., The
*Warren Brothers Roads Co.

Aggremeters
Erie Steel Construction Co.

Agitators, Thickeners and Slurry Mixers
*Smidth & Co., F. L.
*Traylor Engr. & Mfg. Co.

Air Compressors (Stationary)
Fuller Company

Air Filters
*Blaw-Knox Co.
Buell Engineering Co.

Air Separators
*Gruendler Crusher & Pulverizer Co.
Sturtevant Mill Co.
*Williams Patent Crusher & Pulverizer Co.

Alloys (Steel)
Alloy Steel & Metals Co.
Chain Belt Co.
Chicago Steel Fdry. Co.
Manganese Steel Forge Co.
Stulz-Sickles Co.

Arresters (Lightning)
*General Electric Co.

Ash and Refuse Handling Equipment
Chain Belt Co.
*Haiss Mfg. Co., Geo.
Hetherington & Berner, Inc.
*Link-Belt Co.
*Robins Conveying Belt Co.

Asphalt Mixing Plants
Hetherington & Berner, Inc.
McCarter Iron Works, Inc., The
*Warren Brothers Roads Co.

Automatic Feeders
*Fuller Company
*Link-Belt Co.

Automatic Weighers
*Blaw-Knox Co.
Erie Steel Construction Co.
*Fuller Company
*Jaeger Machine Co.

Backfillers
*Bucyrus-Erie Co.
Harnischfeger Corp.
*Lima Locomotive Works

Bagging Machines
Syntron Co.

Balls (Grinding)
*Kennedy-Van Saun Mfg. and Eng. Corp.
Manganese Steel Forge Co.
Straub Mfg. Co.
*Traylor Engr. & Mfg. Co.

Balls (Tube-Mill, etc.)
*Kennedy-Van Saun Mfg. and Eng. Corp.
Manganese Steel Forge Co.
*Smidth & Co., F. L.
Straub Mfg. Co.
*Traylor Engr. & Mfg. Co.

Bases (Trolley)
*General Electric Co.

Battery Charging Equipment
*General Electric Co.

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*Link-Belt Co.
Robins Conveying Belt Co.
*Sprout, Waldron & Co.

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Chain Belt Co.

Belt Fasteners
Bristol Co.

Belt Lacing
Bristol Co.

Belt Rivets
Bristol Co.

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*Link-Belt Co.
Republic Rubber Co.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.

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Goodyear Tire & Rubber Co.

Belting (Multiple V)
Gates Rubber Co.
Goodyear Tire & Rubber Co.
Republic Rubber Co.

Belts (Fan)
Goodyear Tire & Rubber Co.
Republic Rubber Co.

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Chain Belt Co.
Erie Steel Construction Co.
*Fuller Company
*Haiss Mfg. Co., Geo.
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*Hendrick Mfg. Co.
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Manganese Steel Forge Co.
McLanahan and Stone Corp.
*Robins Conveying Belt Co.
Smith Engr. Works
*Sprout, Waldron & Co.

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*Diamond Iron Works
Erie Steel Construction Co.
Heltzel Steel Form & Iron Co.
*Hendrick Mfg. Co.
Hetherington & Berner, Inc.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
Manganese Steel Forge Co.
McLanahan and Stone Corp.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.
*Universal Crusher Co.

Blast-Hole Drills (See Drills—Blast-Hole)

Blasting Machines
DuPont de Nemours & Co., E. I.
National Powder Co.

Blasting Supplies
DuPont de Nemours & Co., E. I.
*Ensign-Bickford Co.
National Powder Co.

Block Machines (Concrete)
Anchor Concrete Machy. Co.
Dunn Mfg. Co., W. E.
Joltcrete, Inc.
Kent Machine Co.
Multiplex Concrete Machinery Co.
Stearns Mfg. Co.
Zagelmeyer Cast Stone Block Machy. Co.

Block Machines (Power Press, Concrete)
Anchor Concrete Machy. Co.
Dunn Mfg. Co., W. E.
Joltcrete, Inc.
Kent Machine Co.
Multiplex Concrete Machinery Co.
Stearns Mfg. Co.
Zagelmeyer Cast Stone Block Machy. Co.

Blocks (Sheave)
*Haiss Mfg. Co., Geo.
*Sauerman Bros., Inc.
*Sprout, Waldron & Co.

Blowers
Buell Engineering Co.

Bodies (Motor Truck, Concrete Mixing)
*Blaw-Knox Co.
Hug Co., The
Jaeger Machine Co.
Ransome Concrete Machinery Co.
Smith Co., T. L.

Bodies (Dump Truck)
Commercial Shearing & Stamping Co.
*Easton Car & Construction Co.

Boots (Rubber)
Goodyear Tire & Rubber Co.

Borings (Core)
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

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*General Electric Co.

Brick Machines (Concrete)
Dunn Mfg. Co., W. E.
Joltcrete, Inc.
Stearns Mfg. Co.

Brick Manufacturing Equipment
Dunn Mfg. Co., W. E.
Stearns Mfg. Co.

Bronze Work (Ornamental)
*Tyler Co., W. S.

Bucket Elevators (See Conveyors and Elevators)

Buckets (Asphalt)
McCarter Iron Works, Inc., The

Buckets (Clamshell, Orange-Peel, Etc.)
*Blaw-Knox Co.
Erie Steel Construction Co.
*Haiss Mfg. Co., Geo.
Harnischfeger Corp.
*Link-Belt Co.
Owen Bucket Co.
Wellman Engineering Co.

Buckets (Dragline—Cableway)
*Bucyrus-Erie Co.
Erie Steel Construction Co.
*Link-Belt Co.
*Sauerman Bros., Inc.
Wellman Engineering Co.

Buckets (Dump)
*Brooks Equip. & Mfg. Co.
*Dempster Bros. Inc.
*Jaeger Machine Co.

Buckets (Elec. Heated, Weighing)
*Easton Car & Construction Co.

Buckets (Elevator and Conveyor)
Chain Belt Co.
Chicago Steel Fdry. Co.
Cross Engineering Co.
*Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.
McLanahan and Stone Corp.
*Robins Conveying Belt Co.
Smith Engr. Works
*Sprout, Waldron & Co.

Buggies (Dump)
*Koehring Co.

Bulk-Cement Storage Plants
Heltzel Steel Form & Iron Co.
*Sprout, Waldron & Co.

Cable (Electric)
*General Electric Co.

Cableways
*American Steel & Wire Co.
Bethlehem Steel Co.
Gilmore Wire Rope Div. of Jones & Laughlin Steel Corp.
*Sauerman Bros., Inc.

Capacitors
*General Electric Co.

Caps (Blasting)
DuPont de Nemours, E. I.
National Powder Co.

Caps (Blasting, Electric)
National Powder Co.

Capstans (See Winches and Capstans)

Car Control Systems
*General Electric Co.

Car Dumpers
*Link-Belt Co.
Wellman Engineering Co.

Car Pullers
Gilmore Wire Rope Div. of Jones & Laughlin Steel Corp.
*Link-Belt Co.

Car Wheels — (See Wheels — Car)

Carriers
*Link-Belt Co.
*Robins Conveying Belt Co.
Smith Engr. Works
*Sprout, Waldron & Co.

Carryalls
*Koehring Co.

Cars (Block, Concrete)
*Link Belt Co.
Multiplex Concrete Machinery Co.

Cars (Industrial)
*Easton Car & Construction Co.

Cars (Quarry & Gravel Pit)
Sanford-Day Iron Works

Castings
Alloy Steel & Metals Co.
Chain Belt Co.
Chicago Steel Fdry. Co.
*Eagle Iron Works
Hetherington & Berner, Inc.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan & Stone Corp.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.

Cement Pumps (See Pumps; Air Pumps; Pumps, Cement Slurry; Pumps, Bulk Cement)

Central Concrete Mixing Plants (Comrp.)
Erie Steel Construction Co.
Heltzel Steel Form & Iron Co.
*Jaeger Machine Co.
*Sprout, Waldron & Co.

Chain Attachments
Chain Belt Co.

Chain Drives
Chain Belt Co.
*Link-Belt Co.

Chain (Dredge and Shovel)
Manganese Steel Forge Co.

Chain (Elevating and Conveying)
Chain Belt Co.
Cross Engineering Co.
*Haiss Mfg. Co., Geo.
*Link-Belt Co.
Manganese Steel Forge Co.
*Sprout, Waldron & Co.

Chutes and Chute Liners
Chain Belt Co.
Cross Engineering Co.
Goodyear Tire & Rubber Co.
*Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.
McLanahan and Stone Corp.
*Robins Conveying Belt Co.
*Smidth & Co., F. L.
*Sprout, Waldron & Co.

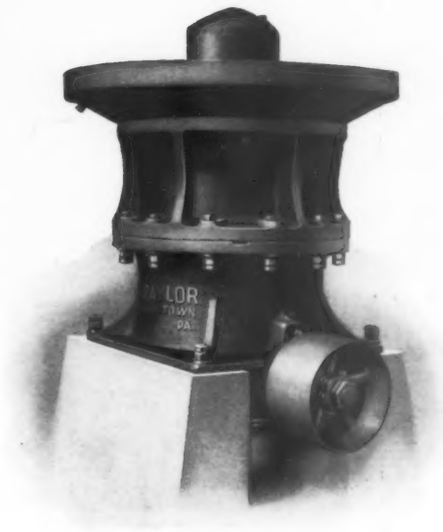
Circuit Breakers and Testers
*General Electric Co.

Classifiers
*Deister Machine Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.
*Link-Belt Co.
*Nordberg Mfg. Co.
Simplicity Engr. Co.
Straub Mfg. Co.
Sturtevant Mill Co.

Clips (Wire Rope)
*American Steel & Wire Co.
Bethlehem Steel Co.
Gilmore Wire Rope Div. of Jones & Laughlin Steel Corp.

Clutches
*Link-Belt Co.
*Sprout, Waldron & Co.

* See also information in the 1938 Pit and Quarry HANDBOOK.



Our Type H Jaw Crusher is the lightest, strongest and most efficient Blake type crusher ever built. See our Bulletin 1105.

every month—
many new users
of the

TRAYLOR
TY REDUCTION CRUSHER

and why not, since this great machine delivers service in overflowing measure? Depend upon it, operators tell each other about the very satisfactory results they get with the "Traylor TY"—and so, more and more want 'em. You, too, will want one, eventually!

Investigate this machine. The full story is told in our Bulletin 2112. Yours for the asking!

TRAYLOR ENGINEERING & MANUFACTURING CO.
ALLENTOWN, PENNSYLVANIA . U.S.A.

NEW YORK CITY, 3916 Empire State Bldg. — CHICAGO, 815 One La Salle St. Bldg. — SALT LAKE CITY, 101 West Second South St. — LOS ANGELES, 919 Chester Williams Bldg. — SEATTLE, 6311 22nd Ave., N. E.

THE CANADIAN FAIRBANKS-MORSE CO., LTD., 980 St. Antoine St., Montreal, P. Q. Canada

B. C. EQUIPMENT CO., LTD., Vancouver, B. C. Canada

MAQUINARIA INTERNACIONAL, S. R. L., Av. Francisco I. Madero No. 17, Desp. 214, Mexico, D. F., Mexico

MANILA MACH. & SUPPLY CO., INC., Manila and Baguio, P. I.

Export Department—104 Pearl St., New York City.

Foreign Sales Agencies: London, Lima, Sao Paulo, Rio de Janeiro, Buenos Aires, Santiago, Valparaiso, Antofagasta, Iquique, Oruro

---

PADDLE LOG TYPE

"DOUBLE EAGLE VALUE"
Gravel WASHERS Sand

SPIRAL SCREW TYPE

EAGLE WASHERS

SINGLE SCREW TYPE

Screw sizes: 15″ to 24″.

Tub sizes: 24″ x 12′ to 33″ x 15′.

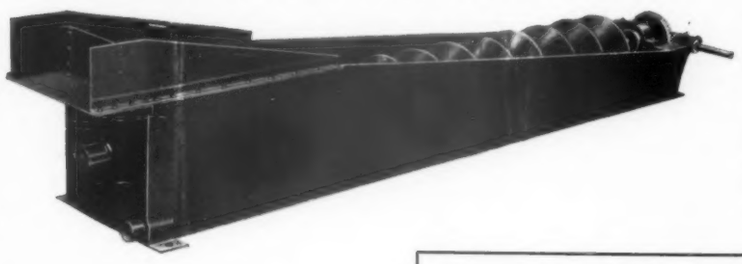
Capacity: 25 to 65 cu. yds. per hour; 35 to 100 tons per hour.

DOUBLE SCREW TYPE

Screw sizes: 18″ to 24″.

Tub sizes: 57″ x 12′ to 60″ x 15′.

Capacity: 60 to 130 cu. yds. per hour; 90 to 200 tons per hour.



Specify Eagle Washers for efficient and economical washing of aggregates in sand and gravel production. Pioneered by Eagle Iron Works and developed through years of building and installation experience—the many exclusive and patented features make Eagle Washers the "best bet" where rigid specifications require superior equipment.

Prominent highway commissions recognize Eagle Washer superiority, as attested by hundreds of letters on file.

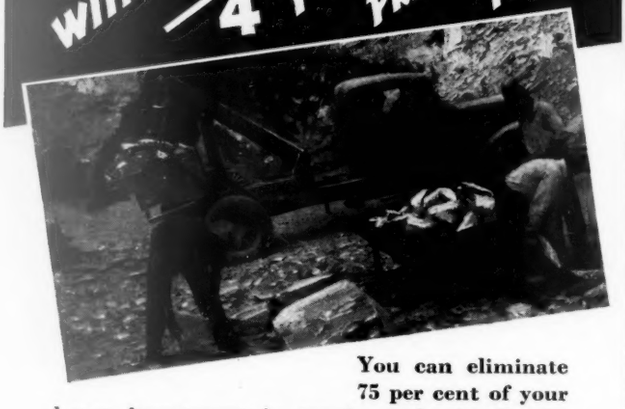
Eagle Spiral Screw Washers effectively remove all foreign material of lighter specific gravity than the aggregate, such as sticks, silt, mud balls and shale.

Eagle Paddle Log Type Washers are specially adapted for the removal of plastic, tough clay balls and cemented conglomerate where greater cutting and abrading action is required.

Ask for Catalog

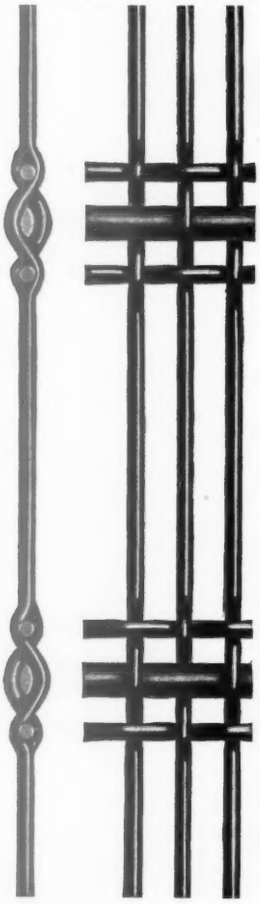
EAGLE IRON WORKS
129 HOLCOMB AVENUE — DES MOINES, IOWA

You can get TWICE the Production WITH 1/4 YOUR PRESENT TRUCKS



You can eliminate 75 per cent of your heavy investment in trucks with the Brooks Load-Lugger, wherever loading is done by hand. Decrease truck operating costs . . . eliminate wasted standing idle time. ONE Load-Lugger and 4 to 8 Load-Lugger Buckets can do the work of a number of trucks . . . with far greater production and at much less cost. Write for the complete cost-cutting story. Demonstrations arranged in most sections.

BROOKS EQUIPMENT & MFG. CO.
79 Davenport Road Knoxville, Tenn.



STA-TRU
Long-Mesh Woven Wire Screens

made to work under tension and vibration.

The straight stay - bars carry ALL the tension. The crimps in the round wires can not be stretched or broken. The screen can not be caused to sag or split by the pull of the tensioning device.

LUDLOW-SAYLOR WIRE CO. ST. LOUIS

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

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Coal-Pulverizing Equipment
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*Smidth & Co., F. L.
*Traylor Engr. & Mfg. Co.
*Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

Compressors (See Air Compressors)

Concentrators (Slurry)
*Deister Concentrator Co.

Concrete Mixers
*Blaw-Knox Co.
Chain Belt Co.
Erie Steel Construction Co.
*Jaeger Machine Co.
*Koehring Co.
Smith Co., T. L.

Concrete Products Plant Equipment
Universal Concrete Pipe Co.

Concrete Slab Raising Equipment (Mud Jacks)
*Koehring Co.

Cones (Sand-Washing)
*Link-Belt Co.
Smith Engr. Works

Controllers (Electric)
*General Electric Co.

Converters (Electric)
*General Electric Co.

Conveyor Belting
Goodyear Tire & Rubber Co.
*Haiss Mfg. Co., Geo.
*Link-Belt Co.
Republic Rubber Co.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.

Conveyor Idlers and Rolls
Chain Belt Co.
*Diamond Iron Works
*Haiss Mfg. Co., Geo.
*Link-Belt Co.
*Robins Conveying Belt Co.

Conveyors and Elevators
Bacon, Inc., Earle C.
Chain Belt Co.
Chicago Steel Fdry. Co.
Cross Engineering Co.
*Diamond Iron Works
*Fuller Company
Gilmore Wire Rope Div. of Jones & Laughlin Steel Corp.
*Gruendler Crusher & Pulverizer Co.
*Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Co.
Lewistown Foundry & Machine Co.
*Link-Belt Co.
McLanahan & Stone Corp.
New Holland Machine Co.
*Robins Conveying Belt Co.
Smith Engr. Works
*Sprout, Waldron & Co.
Straub Mfg. Co.
Sturtevant Mill Co.
Syntron Co.
*Universal Crusher Co.

Conveyors (Pneumatic)
*Fuller Company

Conveyors (Ready-Mixed Concrete)
*Blaw-Knox Co.
Chain Belt Co.
*Haiss Mfg. Co., Geo.
*Jaeger Machine Co.
*Link-Belt Co.
Ransome Concrete Machinery Co.
*Robins Conveying Belt Co.

Conveyors (Vibrating)
Syntron Co.

Coolers (Clinker)
*Fuller Co.
Link-Belt Co.
*Smidth & Co., F. L.
*Traylor Engr. & Mfg. Co.

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Correcting Basins
*Smidth & Co., F. L.

Couplings (Flexible and Shaft)
*Link-Belt Co.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.

Cranes (Crawler and Locomotive)
*Bay City Shovels, Inc.
*Bucyrus-Erie Co.
Harnischfeger Corp.
*Koehring Co.
*Lima Locomotive Works
*Link-Belt Co.

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Erie Steel Construction Co.

Cranes (Overhead)
Erie Steel Construction Co.
Harnischfeger Corp.

Crusher Parts
Alloy Steel & Metals Co.
*American Pulverizer Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
McLanahan and Stone Corp.
*Traylor Engr. & Mfg. Co.
*Universal Crusher Co.

Crushers (Cone)
*Nordberg Mfg. Co.

Crushers (Hammer)
*American Pulverizer Co.
*Brooks Equip. & Mfg. Co.
*Gruendler Crusher & Pulverizer Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Straub Mfg. Co.
Sturtevant Mill Co.
*Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

Crushers (Jaw and Gyratory)
Alloy Steel & Metals Co.
Bacon, Inc., Earle C.
Brooks Equip. & Mfg. Co.
*Diamond Iron Works
*Gruendler Crusher & Pulverizer Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.
New Holland Machine Co.
*Nordberg Mfg. Co.
Smith Engr. Works
Straub Mfg. Co.
*Traylor Engr. & Mfg. Co.
*Universal Crusher Co.

Crushers (Ring)
*American Pulverizer Co.
*Williams Patent Crusher & Pulverizer Co.

Crushers (Roll)
*American Pulverizer Co.
*Brooks Equip. & Mfg. Co.
*Diamond Iron Works
*Gruendler Crusher & Pulverizer Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
New Holland Machine Co.
*Robins Conveying Belt Co.
Straub Mfg. Co.
*Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

Crushers (Rotary)
*American Pulverizer Co.
New Holland Machine Co.
*Williams Patent Crusher & Pulverizer Co.

* See also information in the 1938 Pit and Quarry HANDBOOK.

Crushing Rolls
Alloy Steel & Metals Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
New Holland Machine Co.
Straub Mfg. Co.
Sturtevant Mill Co.
*Traylor Engr. & Mfg. Co.
*Williams Patent Crusher & Pulverizer Co.

Cutter Heads (Dredging)
*Eagle Iron Works

Detonators
DuPont de Nemours, E. I.
National Powder Co.

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Dippers and Teeth (Power Shovel)
*Bucyrus-Erie Co.
*Koehring Co.

Dragline Cableway Excavators
*Bucyrus-Erie Co.
*Link-Belt Co.
*Sauerman Bros., Inc.

Dragline Excavators
*Bay City Shovels, Inc.
*Bucyrus-Erie Co.
Erie Steel Construction Co.
Harnischfeger Corp.
*Koehring Co.
*Lima Locomotive Works
*Link-Belt Co.

Draglines (Walking)
*Bucyrus-Monighan Co.

Dredges
*Bucyrus-Erie Co.
Hetherington & Berner, Inc.
*Morris Machine Works

Driers
*Kennedy Van Saun Mfg. & Eng. Co.
Lewistown Fdry. & Machine
*Link-Belt Co.
McCarter Iron Works, Inc., The
McLanahan & Stone Corp.
*Traylor Eng. & Mfg. Corp.
Tyler Co., W. S.

Drill Bit Reconditioning
*Bucyrus-Erie Co.

Drilling Accessories
*Bucyrus-Erie Co.

Drilling Contractors
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Drills (Blast-Hole)
*Bucyrus-Erie Co.

Drills (Core)
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Drills (Diamond)
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Drills (Wagon)
*Bucyrus-Erie Co.

Drills (Water Well)
*Bucyrus-Erie Co.

Drills (Well) (See Drills—Blast-Hole)

Drives (Multiple Belt, Chain, Rope)
Chain Belt Co.
*Link-Belt Co.

Dust Arresters
*Blaw-Knox Co.
Buell Engineering Co.

Dust Collecting Systems
*Blaw-Knox Co.
Buell Engineering Co.

Dust Conveying Systems
Allen-Sherman-Hoff Co.
*Blaw-Knox Co.
Buell Engineering Co.
*Fuller Company

Dust Filters
Buell Engineering Co.

Dynamite (See Explosives)

Dynamos
*General Electric Co.

Electric Cables (See Cables—Electric)

Electrical Equipment
*General Electric Co.

Electrodes (Welding)
Stulz-Sickles Co.

Elevator Belting (See Belting)

Elevator Buckets (See Buckets—Elevator and Conveyor)

Elevators (See Conveyors and Elevators)

Elevators (Portable)
Barrett-Cravens Co.

Eliminators (Soft Stone) (See Soft Stone Eliminators)

Engineers
Bacon, Inc., Earle C.
Cross Engineering Co.
*Fuller Company
Hetherington & Berner, Inc.
*Kennedy-Van Saun Mfg. and Eng. Corp.
McLanahan and Stone Corp.
*Robins Conveying Belt Co.
*Smidth & Co., F. L.
*Sprout, Waldron & Co.
Sturtevant Mill Co.
*Traylor Engr. & Mfg. Co.
Wellman Engineering Co.

Engine Generator Sets
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Engines (Diesel)
*Nordberg Mfg. Co.

Engines (Internal-Combustion)
*Nordberg Mfg. Co.

Engines (Steam)
*Morris Machine Works
*Nordberg Mfg. Co.

Excavating Machinery (See Shovels; Cranes; Buckets, etc.)

Excavators—Shallow Grading (Bucket Elevator Type)
*Haiss Mfg. Co., Geo.

Explosives
DuPont de Nemours, E. I.
National Powder Co.

Fabricating (Electric Arc and Oxy-Acetylene)
Stulz-Sickles Co.

Fans
*General Electric Co.

Fans (Exhaust)
*Kennedy-Van Saun Mfg. and Eng. Corp.

Feeders
Chain Belt Co.
*Diamond Iron Works
*Fuller Company
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
*Robins Conveying Belt Co.
Smith Engr. Works
*Sprout, Waldron & Co.
Straub Mfg. Co.
Syntron Co.
*Traylor Engr. & Mfg. Co.
*Universal Crusher Co.

Feeders, Weighing (Vibrating)
Syntron Co.

Furnaces (Heat Treating, Electric)
*General Electric Co.

Fuse Cutouts
*General Electric Co.

Fuses (Detonating)
DuPont de Nemours, E. I.
*Ensign-Bickford Co.
National Powder Co.

Fuses (Electrical)
*General Electric Co.

Gas Producers
Wellman Engineering Co.

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Goodyear Tire & Rubber Co.
Republic Rubber Co.

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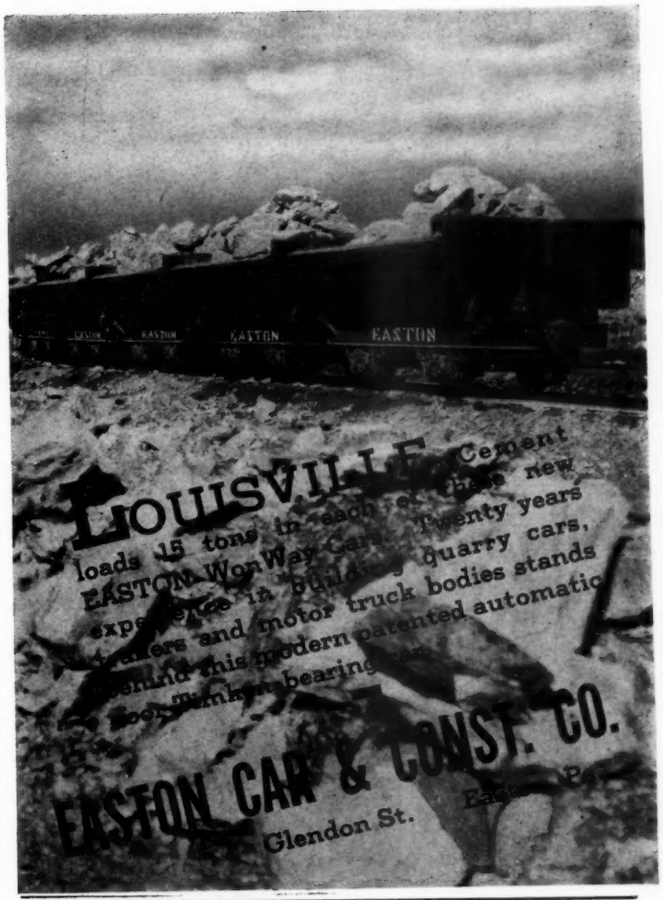
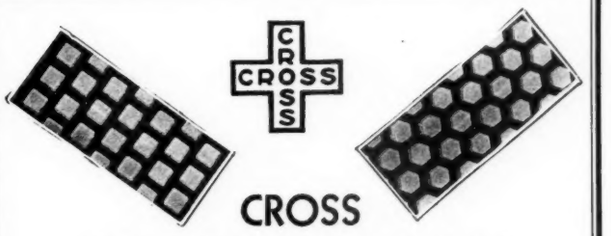
*Haiss Mfg. Co., Geo.
*Link-Belt Co.

Gear Motors
*General Electric Co.

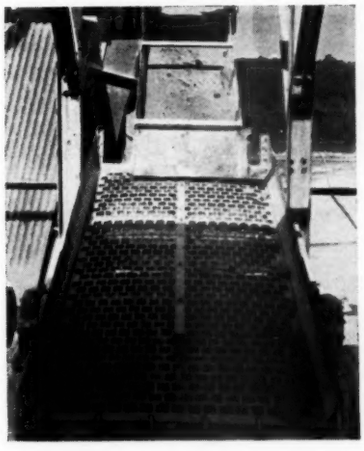
Gears (Herringbone)
Chain Belt Co.
*General Electric Co.
*Link-Belt Co.
*Sprout, Waldron & Co.

* See also information in the 1938 Pit and Quarry HANDBOOK.





CROSS
PERFORATED METAL



CROSS ENGINEERING CO.
MAIN OFFICE & MFG. PLANT, CARBONDALE, PA.
Sales Representatives in Principal Cities

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

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*General Electric Co.
*Haiss Mfg. Co., Geo.
*Link-Belt Co.
*Sprout, Waldron & Co.

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Generator Sets (Motor)
*General Electric Co.
Syntron Co.

Generator Sets (Turbine)
*General Electric Co.

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Generators (Electric)
*General Electric Co.

Glass Sand Equipment
Lewistown Foundry & Machine Co.

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Grapples
Erie Steel Construction Co.
Owen Bucket Co.

Grating (Steel)
*Blaw-Knox Co.
*Hendrick Mfg. Co.

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Grizzly Feeders
*Link-Belt Co.
*Traylor Engr. & Mfg. Co.

Grizzlies
*Eagle Iron Works
*Hendrick Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdry. & Mach. Co.
*Link-Belt Co.
Manganese Steel Forge Co.
*Robins Conveying Belt Co.
Smith Engr. Works

Guards (Wire)
Manganese Steel Forge Co.

Guns (Hydraulic)
Hetherington & Berner, Inc.
Taylor Forge & Pipe Works

Hammer Mills (See Crushers—Hammer)

Haulage Systems (Electric)
*General Electric Co.

Heaters (Bitumen)
*Easton Car & Construction Co.

Hitchings (Links, Pins, Clevises)
Sanford-Day Iron Works

Hoists
Commercial Shearing & Stamping Co.
Harnischfeger Corp.
Hetherington & Berner, Inc.
*Jaeger Machine Co.
McLanahan and Stone Corp.
*Sauerman Bros., Inc.
Smith Engr. Works
*Sprout, Waldron & Co.

Hoppers
*Hendrick Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.

Hose (Air, Steam and Water)
Gates Rubber Co.
Goodyear Tire & Rubber Co.
Republic Rubber Co.

Hose Couplings (See Couplings)

Hose (Petroleum)
Gates Rubber Co.

Hose (Radiator-Engine Cooling)
Gates Rubber Co.
Goodyear Tire & Rubber Co.
Republic Rubber Co.

Hydraulic Guns (See Guns—Hydraulic)

Idlers
Chain Belt Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
Smith Engr. Works
*Sprout, Waldron & Co.

Indicators (Material Level)
*Fuller Company

Indicators (Recording Instruments)
Bristol Co.

Instruments (Electrical)
*General Electric Co.

Insulation (Electric)
*General Electric Co.

Kilns and Coolers (Rotary)
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
*Smidth & Co., F. L.
*Traylor Engr. & Mfg. Co.

Kominuters
*Smidth & Co., F. L.

Ladders (Agitating Dredge)
*Eagle Iron Works

Ladders (Hydraulic Dredge)
*Eagle Iron Works

Lighting
*General Electric Co.

Lights (Flood)
*General Electric Co.

Lime-Handling Equipment
*Fuller Company
*Link-Belt Co.
*Robins Conveying Belt Co.
*Traylor Engr. & Mfg. Co.

Lime Kilns
*Kennedy-Van Saun Mfg. and Eng. Corp.

Linings (Ball- and Tube-Mill) (See Mill Liners and Linings)

Loaders and Unloaders
*Bucyrus-Erie Co.
Chain Belt Co.
*Fuller Company
*Haiss Mfg. Co., Geo.
*Link-Belt Co.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.

Locomotives (Diesel)
Plymouth Locomotive Works Division of Fate-Root-Heath Co.

Locomotives (Diesel-Electric)
*General Electric Co.
Plymouth Locomotive Works Division of Fate-Root-Heath Co.

Locomotives (Electric, Gas &
*General Electric Co.
Plymouth Locomotive Works Division of Fate-Root-Heath Co.

Locomotives (Gas-Electric)
*General Electric Co.
Plymouth Locomotive Works Division of Fate-Root-Heath Co.

Locomotives (Oil Electric)
*General Electric Co.
Plymouth Locomotive Works Division of Fate-Root-Heath Co.

Locomotives (Storage Battery)
*General Electric Co.

Locomotives (Trolley Battery)
*General Electric Co.

Machinery Wearing Parts
Alloy Steel & Metals Co.

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*General Electric Co.

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Manganese Steel Forge Co.

Manganese Steel (Plates and Sheets)
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Manganese Steel Forge Co.

Manganese Steel Castings
Alloy Steel & Metals Co.

Material Handling Equipment
Syntron Co.

Measuring Devices (Electric)
*General Electric Co.

Mechanical Rubber Goods
Gates Rubber Co.
Goodyear Tire & Rubber Co.
Republic Rubber Co.

Meters
*General Electric Co.

Mill Liners and Linings
Alloy Steel & Metals Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Smidth & Co., F. L.
*Traylor Engr. & Mfg. Co.

Mills (Ball, Tube, etc.)
*Traylor Engr. & Mfg. Co.

Mills (Grinding) (See also Crushers—Hammer)
*American Pulverizer Co.
*Brooks Equip. & Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdry. & Mach. Co.
*Smidth & Co., F. L.
*Sprout, Waldron & Co.
Straub Mfg. Co.
*Traylor Engr. & Mfg. Co.
*Williams Patent Crusher & Pulverizer Co.

Mills (Pug)
McCarter Iron Works, Inc., The

Minerals Separation (Cement) (See Cement Minerals Separation)

Mixers
Anchor Concrete Machy. Co.
Kent Machine Co.
*Link-Belt Co.
McCarter Iron Works, Inc., The
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Stearns Mfg. Co.
Zagelmeyer Cast Stone Block Machy. Co.

Motor Control
*General Electric Co.

Motor Trucks
Hug Co., The
Marmon-Herrington Co.

Motors (Electric)
*General Electric Co.

Motors and Generators
*General Electric Co.
Harnischfeger Corp.
Syntron Co.

Motors (Internal-Combustion) (See Engines — Internal-Combustion)

Moulds and Forms (Concrete)
Anchor Concrete Machy. Co.
Dunn Mfg. Co., W. E.
Kent Machine Co.
Multiplex Concrete Machinery Co.
Stearns Mfg. Co.
Zagelmeyer Cast Stone Block Machy. Co.

Nails
*American Steel & Wire Co.

Netting (Locomotive Stack)
*Tyler Co., W. S.

Nozzles (Gravel Washing)
Chain Belt Co.
*Deister Concentrator Co.

Nozzles (Hydraulic) (See Guns—Hydraulic)

Nozzles (Spray)
Chain Belt Co.
*Deister Concentrator Co.
*Link-Belt Co.

Outdoor Lighting Equipment
*General Electric Co.

Packings
Goodyear Tire & Rubber Co.
Republic Rubber Co.

Pallets
Anchor Concrete Machy. Co.
Commercial Shearing & Stamping Co.
Multiplex Concrete Machinery Co.
Stearns Mfg. Co.
Zagelmeyer Cast Stone Block Machy. Co.

Paving Mixers
Chain Belt Co.
*Jaeger Machine Co.
*Koehring Co.

Perforated Metal Plates
Cross Engineering Co.
Chicago Perforating Co.
*Hendrick Mfg. Co.
*Sprout, Waldron & Co.

Photo-Electric Cells
*General Electric Co.

Pipe, Dredge (Floating and Shore)
Naylor Pipe Co.
Taylor Forge & Pipe Works

Pipe Flanges
Hetherington & Berner, Inc.
Naylor Pipe Co.
Taylor Forge & Pipe Works

Pipe Fittings
Hetherington & Berner, Inc.

Pipe Forms (Concrete)
Concrete Pipe Machinery Co.
Quinn Wire & Iron Works
Universal Concrete Pipe Co.

Pipe Machines (Concrete)
Concrete Pipe Machinery Co.
Quinn Wire & Iron Works
Universal Concrete Pipe Co.

Pipe (Spiral)
Naylor Pipe Co.
Taylor Forge & Pipe Co.

Pipe (Water, Gas, Low Pressure Steam)
Hetherington & Berner, Inc.

Pipe (Welded)
Naylor Pipe Co.
Taylor Forge & Pipe Co.

Plug Valves (See Valves)

Pneumatic Conveying Systems (See Conveyors—Pneumatic)

Pneumatic Drills (See Drills, Rock)

Portable Conveyors
*Fuller Company
Haiss Mfg. Co., Geo.
*Link-Belt Co.
*Robins Conveying Belt Co.
*Universal Crusher Co.

Portable Crushing and Screening Plants
Brooks Equip. & Mfg. Co.
*Diamond Iron Works
*Gruendler Crusher & Pulverizer Co.
*Link-Belt Co.
*Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

Portable Washing Plants
*Universal Crusher Co.

Portable Engines (See Engines—Internal Combustion)

*** See also information in the 1938 Pit and Quarry HANDBOOK.**

Right Down to Fighting Weight

You want more than dead weight in a bucket to lick a tough digging job. You want speed—agility! Williams design, welded construction, and special alloys insure stamina and ruggedness, without excessive weight. Williams Buckets carry plenty of weight, but they carry it in the right places and in the right proportions. You move more materials in less time with Williams Buckets—and that's profitable.

...and if that's what you want in a bucket, you'll find your particular type in the Williams Catalog. It's free!

THE WELLMAN ENGINEERING CO.
7014 CENTRAL AVENUE • CLEVELAND, OHIO

Distributors located in all parts of the country represent the Williams Line of Power-Arm, Multiple Rope, Power-Wheel, Single Line, Hook-On and Dragline Buckets.

Send for Catalog

WILLIAMS *Buckets*
***built by* WELLMAN**

BUILT TO LAST...AND MOVE DIRT FAST!

"I'm probably the youngest shovel operator that ever swung a dipper stick—but already PIT AND QUARRY is my favorite magazine."

McCARTER DESIGNS and BUILDS ASPHALT PLANTS TO MEET YOUR NEEDS

When Del Balso Asphalt Corporation required a new Bituminous Paving Materials Plant, only the best installation available was considered. This meant another McCarter job—of course—for hot and cold mixtures, capacities from 80 tons to 100 tons per hour.

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McCarter asphalt mixing plant installations and engineering service are your assurance of economical performance. Designed for your specific requirements in plot conditions and operation. We fabricate, erect and equip complete portable or stationary plants. Your present equipment can be modernized at a cost that will be paid back in better operation and extra profits. *Send for Bulletin.*

Designers and Manufacturers uninterruptedly since 1827.

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NORRISTOWN PENNSYLVANIA

HOTEL PHILADELPHIAN

FORMERLY HOTEL PENNSYLVANIA
DANIEL CRAWFORD, JR., MANAGER
39th and CHESTNUT STREETS
PHILADELPHIA, PENNA.

Our courteous and competent staff will give you the utmost in friendliness, comfort and service. Conveniently located to all stations, and only five minutes away from the heart of the business section.

600 ROOMS each with bath from $2.75 up

Lounge and Restaurants *Unrestricted Parking to 3 A.M.*

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

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*American Steel & Wire Co.

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Broderick & Bascom Rope Co.

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*Sprout, Waldron & Co.

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*Sprout, Waldron & Co.

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*Fuller Company

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*Morris Machine Works

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*General Electric Co.

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*Link-Belt Co.
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Simplicity Engr. Co.
Smith Engr. Works

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*Link-Belt Co.
*Nordberg Mfg. Co.
Smith Engr. Works

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*Sauerman Bros., Inc.

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Bacon, Inc., Earle C.
Chain Belt Co.
Chicago Perforating Co.
Cleveland Wire Cloth & Mfg. Co.
Cross Engineering Co.
*Deister Concentrator Co.
*Deister Machine Co.
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*Eagle Iron Works
*Gruendler Crusher & Pulverizer Co.
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*Hendrick Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
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Manganese Steel Forge Co.
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Simplicity Engr. Co.
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*Sprout, Waldron & Co.
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*Traylor Engr. & Mfg. Co.
*Tyler Co., W. S.
*Universal Crusher Co.

Screens (Vibrating or Shaking)
*Deister Concentrator Co.
*Deister Machine Co.
*Diamond Iron Works
*Gruendler Crusher & Pulverizer Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.
*Link-Belt Co.
McLanahan and Stone Corp.
New Holland Machine Co.
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Screen Equipment Co.
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*Sprout, Waldron & Co.
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*Tyler Co., W. S.

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*Haiss Mfg. Co., Geo.
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*Bucyrus-Erie Co.
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Silos
Chain Belt Co.
*Smidth & Co., F. L.

Skids
*Easton Car & Construction Co.

Skip Hoists and Skips
Chain Belt Co.
Hetherington & Berner, Inc.
*Link-Belt Co.
*Robins Conveying Belt Co.

Speed Reduction Units
Chain Belt Co.
*General Electric Co.
*Link-Belt Co.

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Sprays
*Deister Concentrator Co.

Sprockets and Chain
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*Link-Belt Co.
*Sprout, Waldron & Co.
Straub Mfg. Co.

Starters (Automatic Motor)
*General Electric Co.

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Steel (High Tensile)
Gilmore Wire Rope Div. of Jones & Laughlin Steel Corp.
Manganese Steel Forge Co.

Steel (Open Hearth)
Gilmore Wire Rope Div. of Jones & Laughlin Steel Corp.
Manganese Steel Forge Co.

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Steel Plate Construction
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Heltzel Steel Form & Iron Co.
Hetherington & Berner, Inc.
Manganese Steel Forge Co.
*Sprout, Waldron & Co.

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Owen Bucket Co.

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Chain Belt Co.
*Chicago Bridge & Iron Co.
Erie Steel Construction Co.
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*General Electric Co.

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*General Electric Co.

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*General Electric Co.

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Tamp Machines (Hand, Concrete)
Anchor Concrete Machy. Co.
Kent Machine Co.
Multiplex Concrete Machinery Co.
Stearns Mfg. Co.
Zagelmeyer Cast Stone Block Machy. Co.

Tampers (Power and Hand)
Syntron Co.

Tanks
Heltzel Steel Form & Iron Co.
*Hendrick Mfg. Co.
*Link-Belt Co.
*Traylor Engr. & Mfg. Co.

Tanks (Sand-Settling)
*Link-Belt Co.
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Testing Sieves and Shakers
*Hendrick Mfg. Co.
*Tyler Co., W. S.

Tire Repair Materials
Goodyear Tire & Rubber Co.

Tires (Trucks, Passenger Cars or Tractors)
Goodyear Tire & Rubber Co.

Tools (Drill) (See Drilling Accessories)

Track Shifters
*Nordberg Mfg. Co.

Trailers
Marmon-Herrington Co.

Trailers (Dump)
Sanford-Day Iron Works

Trailers (Industrial)
Marmon-Herrington Co.

Trailers (Industrial & Quarry)
*Easton Car & Construction Co.

Trailers (Motor Truck)
Hug Co., The

Tramways (Aerial Wire Rope)
*American Steel & Wire Co.
Bethlehem Steel Co.

Transformers
*General Electric Co.

Transmission Belting (See Belting)

* See also information in the 1938 Pit and Quarry HANDBOOK.

KUE-KEN BALANCED CRUSHER

MAKES LITTLE ONES OUT OF BIG ONES IN MORE WAYS THAN ONE

Makes—Big rocks into fine gravel in a single pass.

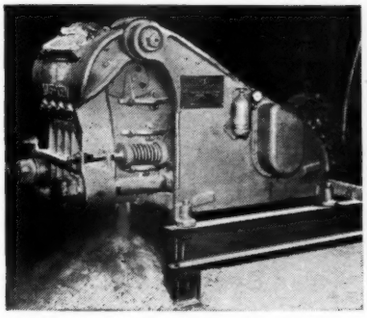
Makes—Big investment into a small one. One Kue-Ken instead of two or more ordinary crushers, rolls, bins, elevators, screens, etc.

Makes—Big power bills into small ones. 2 to 5 times capacity of ordinary crushers of equal size and weight.

Makes—Big running expenses into small ones. KUE-KEN crushes without abrasion. Less wear. Mechanism sealed in filtered oil bath for long life.

Makes—Big expensive foundations into small ones. Perfect balance eliminates foundations.

Makes—Big freight charges into small ones. Balanced mechanism eliminates heavy frame and flywheels.



Photograph of KUE-KEN crusher on steel frame not even bolted to floor crushing 12" rocks to ⅛" in a single pass.

SEND TODAY FOR BULLETIN 600

STRAUB MFG. CO. 528 CHESTNUT STREET OAKLAND, CALIFORNIA

SUPER PYRASTEEL ALLOY

FOR HIGH TEMPERATURES

"Best in the End"

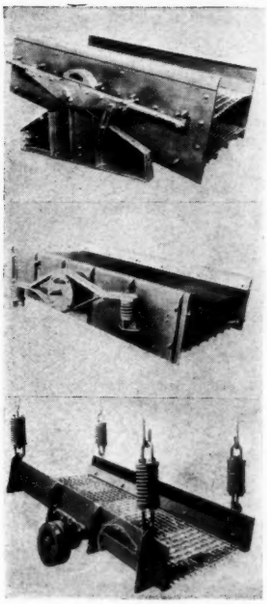
—that is the common experience of cement mill men who have been using Pyrasteel kiln ends for years. The tight fitting connection to the kiln makes possible large fuel economies.

One producer* reports a saving of 10 lb. of coal per barrel of cement—which would mean ten tons per day for an average 2000-bbl. plant.

*Name on request.

Write for Pyrasteel Bulletin

CHICAGO STEEL FOUNDRY COMPANY
37th Street at Kedzie Avenue, CHICAGO, ILLINOIS
MAKERS OF ALLOY STEEL FOR OVER 25 YEARS



GYREX

A husky screen for scalping and sizing at capacities up to 1000 T. P. H.

VIBREX

STYLE H

Best for fine screening at high speed. Adjustable slope and stroke.

VIBREX

STYLE J

A highly efficient small screen. The 2'x4' size at $165.00.

SCREENS

The three types of screens include more than 300 sizes and models. Experience proves that true economy in screening is obtained only when the screen used exactly fits the work to be done.

ROBINS CONVEYING BELT COMPANY

MATERIAL HANDLING ROBINS EQUIPMENT

15 Park Row New York, N. Y.

Offices in Principal Cities

Send for Screen Bulletins

Sauerman Scraper moving gravel from hill to plant conveyor.

Sauerman Scraper stores and reclaims surplus output of large plant.

DIG and HAUL *. . at low cost*

FOR more than a quarter of a century, Sauerman Slackline Cableways and Drag Scrapers have been the preferred excavating equipment of the sand and gravel industry.

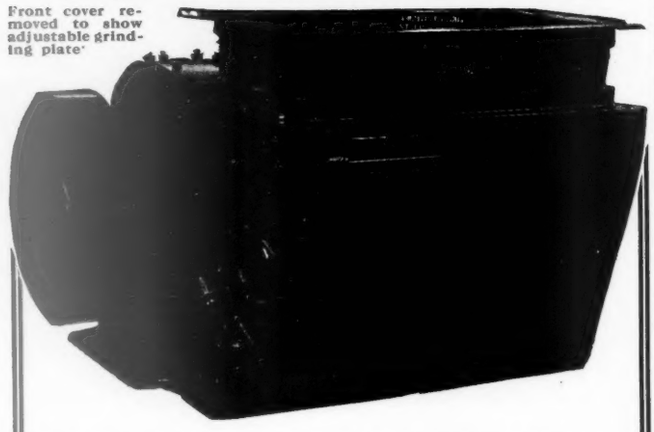
The reason for this preference is that Sauerman machines combine excavating and conveying in a simple, continuous, straight-line operation and thus the complete handling of the raw materials is accomplished at a minimum cost per cubic yard.

A number of these money-making Sauerman installations at sand and gravel plants, stone crushing plants, cement mills, etc., are illustrated and described in our 84-page catalog. Write for your copy of this useful book.

SAUERMAN BROS., Inc.
434 S. Clinton St., Chicago

Sauerman Cableway, operated by one man, handles 1,000 tons of gravel per day from river-bar to plant.

"BUY AMERICAN"



Front cover removed to show adjustable grinding plate

Patriotism begins at home . . . right in your own plant . . . by producing the most uniform aggregates at lowest possible cost. That's why it pays to buy American Crushers for the toughest rock reduction jobs.

Simplicity in Design	Ruggedness in Construction
SKF Roller Bearings	Cast Steel Adjustable Platen
Alloy Steel Shaft	Manganese Lined Chamber

Write for Bulletin listing all sizes of American Crushers

AMERICAN PULVERIZER CO.
1245 Macklind Ave. St. Louis, Mo.

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

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*Link-Belt Co.

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*Easton Car & Construction Co.

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Goodyear Tire & Rubber Co.

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*Easton Car & Construction Co.

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Chain Belt Co.
*Fuller Co.
*Link-Belt Co.

Valves (Pump)
Taylor Forge & Pipe Works

Variable Speed Reducers or Transmissions
Chain Belt Co.
*Link-Belt Co.

Vibrating Screen Plate
Chicago Perforating Co.
Cross Engineering Co.
*Hendrick Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.

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Vibrators
*Link-Belt Co.
Syntron Co.
*Tyler Co., W. S.

Vibrators (Concrete)
Anchor Concrete Machinery Co.
Joltcrete, Inc.
Multiplex Concrete Machy. Co.
Stearns Mfg. Co.

Wagons (Dump)
*Koehring Co.

Washers (Sand, Gravel and Stone)
*Diamond Iron Works
*Eagle Iron Works
*Haiss Mfg. Co., Geo.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Mach. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
*Smidth & Co., F. L.
Smith Engr. Works
Straub Mfg. Co.
*Traylor Engr. & Mfg. Co.
*Tyler Co., W. S.
*Universal Crusher Co.

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(See Machinery Wearing Parts)

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*Blaw-Knox Co.
Erie Steel Construction Co.
*Fuller Co.
Heltzel Steel Form & Iron Co.
*Jaeger Machine Co.

Welding Bars, Wedge and Applicator (Nickel - Manganese Steel)
Stulz-Sickles Co.

Welding and Cutting Equipment
*General Electric Co.
Stulz-Sickles Co.

Welding Rods
Stulz-Sickles Co.

Welding Service
Stulz-Sickles Co.

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*American Steel & Wire Co.
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Harnischfeger Corp.
Manganese Steel Forge Co.

Wheels (Car)
Sanford-Day Iron Works

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Alloy Steel & Metals Co.
Chain Belt Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
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*American Steel & Wire Co.
*General Electric Co.

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Ludlow-Saylor Wire Co.
Manganese Steel Forge Co.
National Wire Cloth Co.
*Robins Conveying Belt Co.
*Tyler Co., W. S.

Wire Rope
*American Cable Division of The American Chain & Cable Co., Inc.
*American Steel & Wire Co.
Bethlehem Steel Co.
Broderick & Bascom Rope Co.
Gilmore Wire Rope Div. of Jones & Laughlin Steel Corp.

Wire Rope Fittings
*American Cable Division of The American Chain & Cable Co., Inc.
*American Steel & Wire Co.
Bethlehem Steel Co.
Broderick & Bascom Rope Co.
Gilmore Wire Rope Div. of Jones & Laughlin Steel Corp.

Wire Rope Slings
*American Cable Division of The American Chain & Cable Co., Inc.
*American Steel & Wire Co.
Bethlehem Steel Co.
Broderick & Bascom Rope Co.
Gilmore Wire Rope Div. of Jones & Laughlin Steel Corp.

Wire (Welding)
*American Steel & Wire Co.
Gilmore Wire Rope Div. of Jones & Laughlin Steel Corp.
Manganese Steel Forge Co.

Worm Gears (See Gears and Pinions)

* See also information in the 1938 Pit and Quarry HANDBOOK.

USE

MANGANAL

Reg. U. S. Patent Office

Patents # 1,876,738—1,947,167—2,021,945

11 to 13½% Nickel Manganese Steel

HOT ROLLED PLATES

3/16" TO 1" THICK

FOR LINERS, FABRICATING NEW PARTS, PATCHING BY WELDING, ETC.

SOLE PRODUCERS

STULZ-SICKLES CO. NEWARK, N. J.

MORRIS

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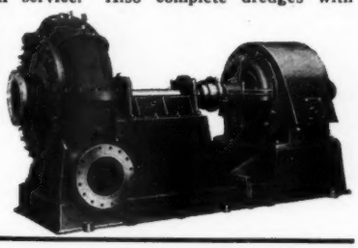
For hydraulic dredging, filling, sand and gravel production, hydraulic conveying of slurry and other liquids containing abrasive materials, clear water pump for general service. Also complete dredges with all accessory equipment. Dredging pump designs include heavy-duty types and special alloy parts for severe service. Types and sizes for the largest or smallest operations, and belt, motor, steam, oil or gasoline-engine drive.



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Morris Machine Works

Baldwinsville, N. Y.

Lewistown Foundry Products

ARE

Performance-Tested

BUCKET ELEVATORS

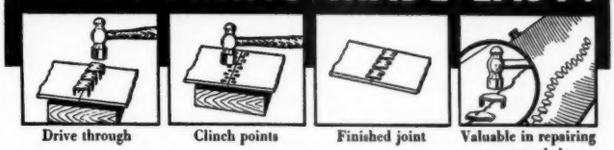
REVOLVING SCREENS

CRUSHERS DRY PANS

Lewistown Foundry & Machine Co.

Lewistown, Pa.

BELT JOINING MADE EASY!



Drive through | Clinch points | Finished joint | Valuable in repairing conveyor belts

All you need to make quick joints on your belts or conveyors are a hammer, a block of soft wood,—and Bristol's Steel Belt Lacing. No need for special tools or experienced lacers. No need for costly shut-downs. Bristol's are available in sizes and styles for smooth, durable, lock-tight joints on any belt material and thickness from lightest split leather to ten ply stock. Full details in Bulletin No. 725. Write for it. THE BRISTOL COMPANY, Mill Supply Division, WATERBURY, CONN. Branches in Principal Cities.

BRISTOL'S

TRADE MARK REG. U. S. PAT. OFF.

DIAMOND Roller Bearing JAW CRUSHER

A Dealer Near You to Serve You

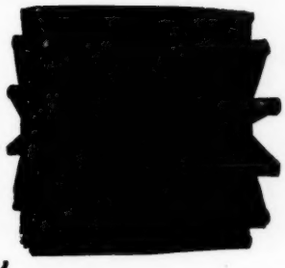
Diamond Roller Bearing Crushers have greater capacity, require less power, practically no maintenance, and lubrication cost is negligible.

Write for Literature

DIAMOND IRON WORKS INC.

AND THE MAHR MANUFACTURING CO. DIVISION

MINNEAPOLIS, MINNESOTA, U. S. A.



CONVEYORS LAST LONGER

where SPROUT-WALDRON Wing Pulleys are used. The same is true of your Elevator belts.

Material conveyed cannot lodge between belt and pulley to cut your belts.

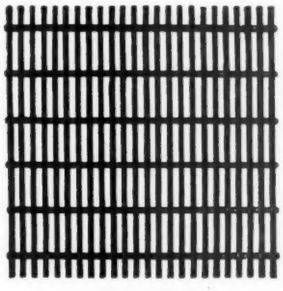
Interchangeable with standard pulleys.

Write for catalog

SPROUT, WALDRON & CO., INC.

1221 SHERMAN ST., MUNCY, PA.

Elevating, Conveying and Transmission Equipment



Rolled Slot

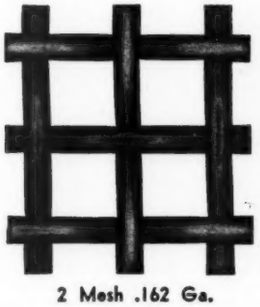
ALLOY No. 2

A super wearing Steel developed to resist the abrasion and vibration of modern screening demands.

"CLEVELAND" SCREENS

A wire cloth of guaranteed accuracy backed by fine workmanship and an effort to satisfy.

Available in Square Mesh and Rolled Slot. A trial will convince you of the superiority.



2 Mesh .162 Ga.

THE CLEVELAND WIRE CLOTH & MFG. COMPANY

574 E. 78th St. CLEVELAND, OHIO

IMMEDIATE LIQUIDATION

of former MARIANNA LIME PRODUCTS CO., WHITE CLIFFS, ARK.

1—7′ dia. x 56′8″ long DIRECT OR INDIRECT HEAT ROTARY DRYER, made by L. R. Christie Co., Pittsburgh, Pa. Oil fired, equipped with special inner shell, exhauster, feeder, screw conveyor for discharged product; 9″ wide girth gear, 8½″ wide tires, 7/16″ shell.

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1—1 YD. DIESEL OPERATED COMBINATION SHOVEL AND DRAGLINE, BUCYRUS-ERIE D-2, CRAWLER MOUNTED, WITH ATLAS IMPERIAL FULL DIESEL ENGINE, 40′ STEEL BOOM, PAGE SCRAPER DRAGLINE BUCKET; SHOVEL EQUIPMENT—BOOM 23′ LONG, DIPPER HANDLE 15′. 1 YD. DIPPER.

1—30″ x 54″ OCALA SINGLE ROLL CRUSHER, toothed rolls, manganese steel liners, steel housing.

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1—No. 6 Williams "Jumbo" Hammer Mill, 42″ wide, 12 hammers per row, 8″ dia. main shaft with Texrope drive and 200 H.P. Allis-Chalmers 3/60/2200 volt, 705 RPM. slip ring motor.

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RAYMOND HIGH SIDE ROLLER MILLS

3—4-roll Raymond High Side Pulverizers, for finenesses up to 99.5% through 325 mesh, each mill complete with 7′ dia. vacuum separator, No. 11 Raymond exhauster, cyclone collector, 7′ dia. tubular dust collector and all interconnecting piping.

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15—18″ Belt Conveyors; 15′ c/c, 15′ c/c, 20′ c/c, 22′ c/c, 22′ c/c, 38′ c/c, 63′ c/c, 76′ c/c, 100′c/c, 100′ c/c, 115′ c/c, 120′ c/c, 120′ c/c, 140′ c/c, 140′ c/c.

BUCKET ELEVATORS:

5—40′ c/c Bucket Elevators, 9x18″ steel buckets, double chain, wood housings.

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1—No. 30 Caterpillar Tractor.
1—60 H.P. Fairbanks-Morse Single Cylinder Diesel Engine, Type Y, Style VA.
1—10″x8″ Ingersoll-Rand ER-1 belt driven Air Compressor.
1—No. 1½GT Clipper Well Driller, mounted on steel wheels, gasoline driven.
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2—Howes belt driven Bag Packers.
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1—No. 37 Kennedy Reduction Crusher, with 3/60/440 volt motor in pulley.
6—Belt Conveyors, trough type; 30″ 212′ c/c; 24″—237′ c/c; 20″—212′ c/c; 252′, 288′, 302′ c/c.
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NEW 2000 watt Gas Light Plant, 25-110V DC.
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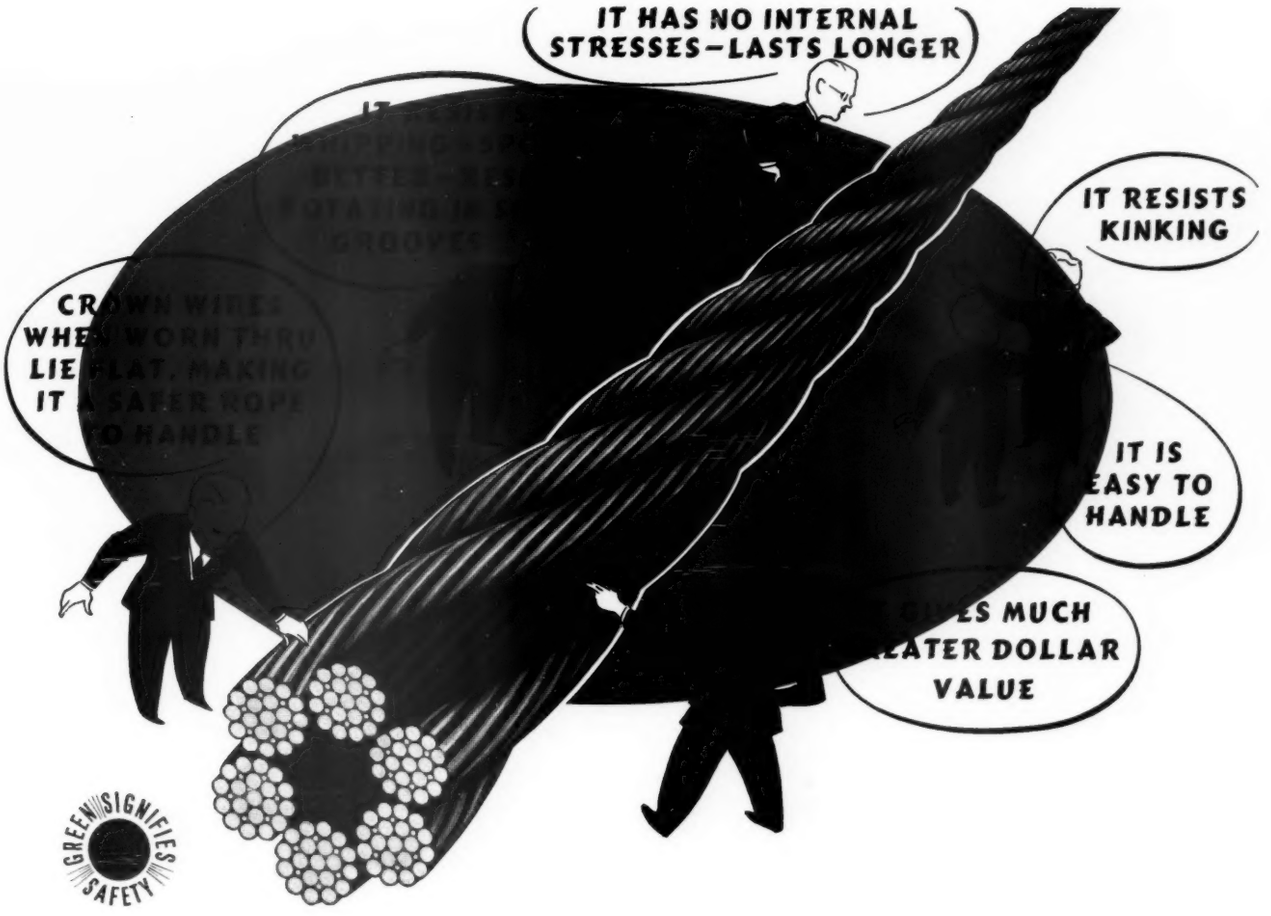

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District Offices: Atlanta, Chicago, Detroit, Denver, Los Angeles, New York, Philadelphia, Pittsburgh, Houston, San Francisco

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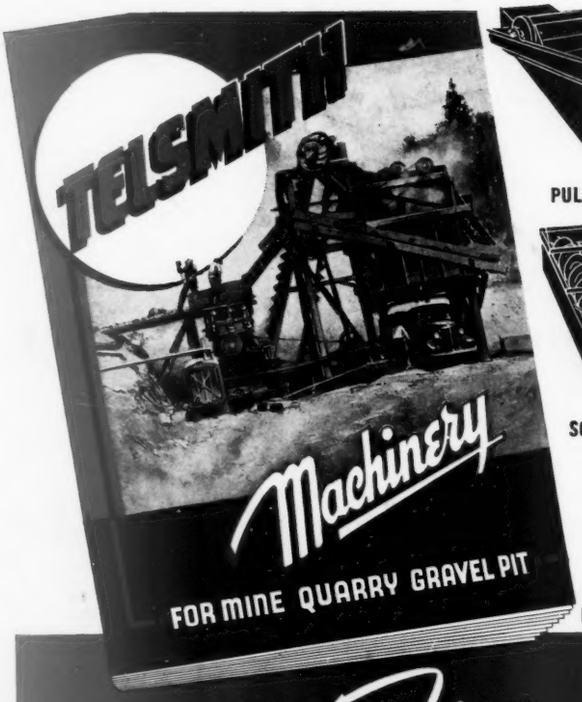
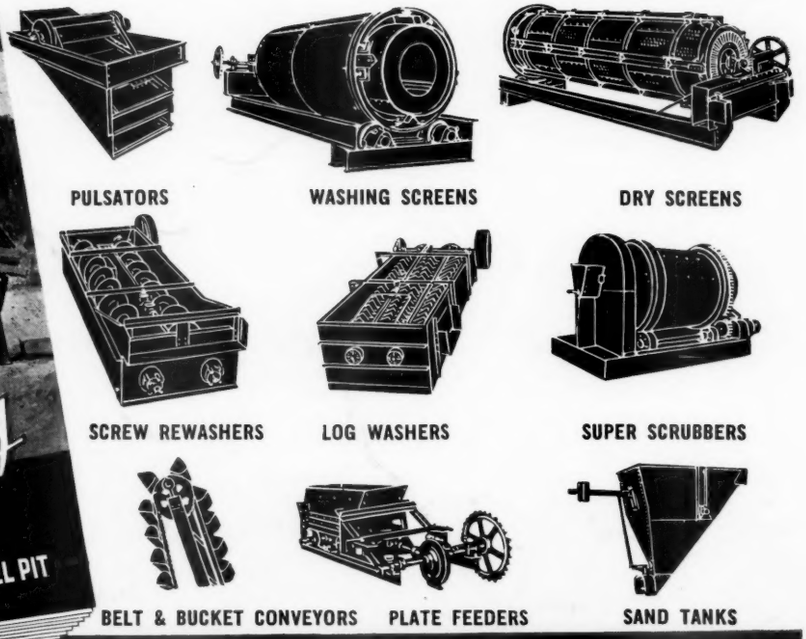
AMERICAN CHAIN COMPANY, INC.





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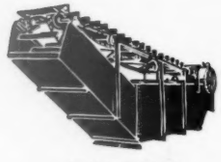
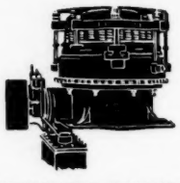
TELSMITH



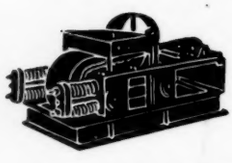
SAND DRAGS



GYRASPHERE CRUSHERS

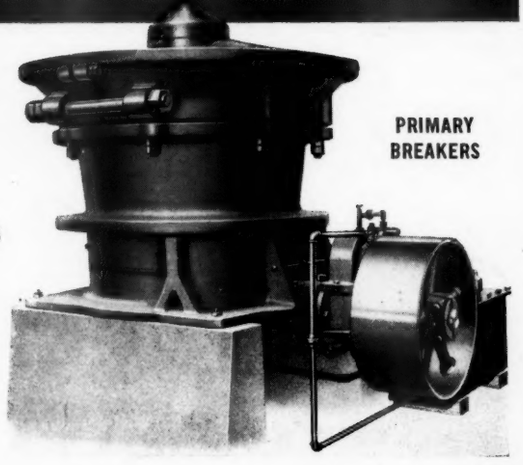
WHEELING JAW CRUSHERS

ROTARY GRIZZLIES



DOUBLE ROLL CRUSHERS

REDUCTION CRUSHERS



PRIMARY BREAKERS